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Current Usage of Payments Agreements and Trade Agreements

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The Organization of Inconvertibility

TWO MAIN FORMS of inconvertibility may be distinguished. Inconvertibility on resident account (internal inconvertibility) means that persons or firms in a country whose currency is inconvertible (hereinafter called an inconvertible country) are not permitted to use the currency of their country to make to nonresidents (wherever the nonresidents may be) payments at their own discretion and for any purpose not specifically prohibited for reasons of public order. Similarly, they are not permitted to receive payments freely from any source outside their own country. Inconvertibility on nonresident account (external inconvertibility) means that nonresidents receiving proceeds in the currency of the inconvertible country, or having claims therein, are not permitted to use that currency freely in all parts of the world and for any purposes, whether to obtain goods and services from the inconvertible country or to exchange the currency received for other currencies.

Formally, inconvertibility on nonresident account among inconvertible countries—not, of course, vis-à-vis the United States and other dollar countries—is organized largely on the basis of bilateral agreements between governments or central banks. These agreements are usually referred to as bilateral payments agreements.[1] In Western Europe, nonresident inconvertibility has been organized since mid-1950 on the basis

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[1] Other terms with varying connotations which have been widely used are monetary agreements, compensation agreements, offset account agreements, open account agreements, and the looser expression, clearing agreements. For the distinction in U.K. exchange control terminology between payments agreements and monetary agreements, see p. 388. The expression *gebundener Zahlungsverkehr* (bound payments) covers all these terms; exchange control is a wider concept, including quantitative trade and exchange controls and multiple currency practices.

of a plurilateral payments agreement, the European Payments Union (EPU) agreement, concluded by the 18 countries that are members of the Organization for European Economic Cooperation (OEEC). When the European Payments Union was established, these countries adapted the bilateral payments agreements already in force among them, or concluded new agreements where they did not exist, with a view to permitting monthly clearing of their net payments positions with all other members of the group. The organization of nonresident inconvertibility between pairs of inconvertible countries may be facilitated by the transferability of a third country's inconvertible currency, as in various countries that use sterling for a large part of their international settlements. This has been particularly important where payments agreements have not been negotiated. External inconvertibility between two countries may also be enforced by the unilateral or bilateral subjection of reciprocal payments to a clearing regime of the interwar type. This has been rare, however, in the postwar world. An illustration is the introduction by Switzerland in January 1954 of a clearing regime for all payments to and from Uruguay relating to direct trade in goods originating in either country.

Nonresident inconvertibility vis-à-vis convertible countries has been imposed mainly in relation to capital transfers. Convertible countries' current earnings from inconvertible countries are, in nearly all cases, settled in convertible exchange or in domestic currency of a type which is convertible upon demand, such as American Account sterling. Exceptions have been made mainly with regard to payments for oil and motion picture films; the use of these proceeds has occasionally been subject to special arrangements between the exporter and the exchange control of the importing country.

Resident inconvertibility in relation to other inconvertible countries is largely organized on the basis of bilateral trade agreements establishing quotas for imports, exports, and invisibles, and of the OEEC Code of Liberalization. Resident inconvertibility vis-à-vis convertible countries is implemented mainly by unilaterally imposed quantitative import and exchange restrictions that usually are subject to a high degree of administrative discretion.

There are today[2] over 400 bilateral payments agreements and similar arrangements in force. Of these, approximately 235 are between pairs of European countries, including more than 90 between EPU members. Next in numerical importance is the network of payments agreements between European countries on the one hand and Latin American republics on the other; their number is approximately 100. European coun-

[2] This paper was completed toward the end of October 1954.

tries also have close to 60 payments agreements with countries in the Middle East and the Far East. Finally, there are a much smaller number of intraregional bilateral payments agreements in Latin America and in the Middle East and the Far East. Most payments agreements are accompanied by bilateral trade agreements.

In addition to these bilateral payments agreements, there are many arrangements which create a direct link between two countries although there is no formal payments agreement. The link consists of other methods of exchange binding. In some cases, these arrangements provide for the financing of reciprocal trade in one of the two countries' currencies. Thus Belgium finances its trade with Argentina mainly in Belgian francs and, despite the absence of a payments agreement, does not consider that country part of the dollar area.[3] No payments agreement has been concluded between Finland and Sweden, which finance their intertrade in Swedish kronor, and, since the termination of their bilateral payments agreement, effective October 1, 1954, trade between Finland and Western Germany has been financed in transferable deutsche marks. Some of Chile's nitrate sales contracts create a situation similar to that in which a bilateral trade agreement is combined with a bilateral payments agreement. A second type of arrangement in this category is Italy's global compensation agreement, such as it has had with Chile, Peru, and some Central American republics. Under an arrangement of this type, it is agreed that there will be a series of private compensation transactions for a predetermined total amount, each transaction being financed either in free U.S. dollars or (in one case) in sterling. Normally, they are concluded only with dollar area countries with which Italy is not linked by a payments agreement. Third, there are a number of compensation agreements between West European and East European countries, under which, whether there is a payments agreement or not, trade is carried on—usually on the basis of individual compensation transactions—within pre-established totals; thus these agreements might be described as global compensation agreements. Sometimes there is no agreement between governments, but the western signatory is a trade organization, such as a Chamber of Commerce, because the western country has not given diplomatic recognition to the other country. This has been particularly important in relation to Eastern Germany.

In a fourth type of bilateral arrangement, one partner commits itself to spend in the other country a certain proportion of its exchange earnings from the latter, although payments either way continue to be

[3] Since this paper was written, the Belgium-Luxembourg Economic Union has made a combined trade and payments agreement with Argentina.

made in convertible exchange.[4] This is the kind of arrangement that was agreed between Western Germany and Peru. Under some other trade agreements where all trade is financed in convertible exchange, an industrial country may obtain preferential access to the import market of a primary producing dollar country by undertaking certain specific purchase commitments with regard to the latter's exports. Thus a considerable number of European countries have been able to bypass the obstacle of the Colombian prohibited list by undertaking to purchase specified amounts of coffee, bananas, and minor exports. Similarly, Austria, Western Germany, and the United Kingdom have been granted preferential tariff treatment by Cuba in exchange for purchase commitments respecting sugar, cigars, and certain minor exports. Bilateral relationships may also be created where trade is financed in free U.S. dollars under the terms of a "payments agreement" which provides that trade shall be balanced at the highest possible level. Japan's "cash dollar" agreements with Belgium, Peru, Syria, and Uruguay are examples of this relationship.

Finally, there is frequently some formal element of bilateralism in the trade and payments relations between countries financing their reciprocal trade in an inconvertible currency under the terms of a multilateral arrangement. Examples are the West German trade agreements with Ceylon, India, and Pakistan, and those of Australia with Argentina, Brazil, Indonesia, and Western Germany. Under all these agreements, payments are effected in sterling in terms of payments agreements concluded with the United Kingdom. There is at least one bilateral trade agreement between non-sterling area countries which provides for financing in transferable sterling.

The network of payments agreements and similar arrangements is vast, and the use made of inconvertible exchange is considerable. The United Kingdom and the other countries of Western Europe have concluded payments agreements with each other and with many East European, Latin American, and Middle Eastern countries. In the Far East and the Middle East, Indonesia, Japan, Egypt, Iran, and Israel make extensive use of bilateral payments agreements. The same is true in Latin America of Argentina, Brazil, Chile, Paraguay, and Uruguay. A calculation made for 1951 shows that at least 60 per cent of the trade

[4] Such arrangements are reminiscent of the interwar agreements, of which the Roca-Runciman agreement, signed by Argentina and the United Kingdom in 1933, was an outstanding example. It provided that payments between the two countries would continue in convertible exchange, but Argentina was committed to spend in the United Kingdom the full proceeds of its sales to that country, except for a "reasonable sum" which Argentina was entitled to use annually in servicing its public external debts to third countries. In the 1930's, pacts of this kind, by which the use of earnings in convertible currencies was predetermined, were often referred to as payments agreements, as distinct from clearing agreements.

of the noncommunist world in that year was settled in inconvertible currencies.[5] The EPU alone settles probably some 50 per cent of the payments resulting from world trade.[6] The payments turnover under payments agreements not compensated through the EPU mechanism, however, is relatively small and probably corresponds to only 5 or 10 per cent of world trade, despite the fact that the number of payments agreements between OEEC countries constitutes less than one quarter of the total number of payments agreements. The Netherlands Bank Annual Report for 1953 states that barely 15 per cent of the country's total turnover of goods and services in international transactions that year was accounted for by transactions in convertible currencies. Even Switzerland, which applies virtually no restrictions on transfers to convertible countries, has in recent years settled about 70 per cent of its international trade in inconvertible currencies, and figures for other major trading countries in Europe are similar. Payments agreements or similar arrangements constitute the formal framework of nonresident inconvertibility in nearly all important bilateral relationships between inconvertible countries. They have provided the institutional basis for the acceptance and use of inconvertible currencies. The agreements do not relate directly to the inconvertibility that exists vis-à-vis the convertible countries. Indirectly, however, the character and intensity of the import and exchange restrictions applied against convertible countries are greatly affected by the functioning of the various inconvertibility arrangements. The importance of these relationships is to some extent obscured, first by the secrecy that in most countries surrounds both the text and the implementation of many bilateral arrangements, and second by the considerable scope that exists for administrative discretion even under arrangements whose terms have been made public.

Main Features of Payments Agreements and Trade Agreements

Payments agreements

Under bilateral payments agreements, the partner countries undertake to effect their reciprocal current settlements in a way that will minimize the use of convertible exchange and gold. In a typical case, the two central banks open accounts in their respective currencies in each other's names, but agreements may also provide for one (main) agreement account. All permitted payments are channeled through these agreement

[5] Raymond F. Mikesell, *Foreign Exchange in the Postwar World* (New York, 1954), p. 135.

[6] Ernest Waters, "The European Payments Union," in *At Work for Europe* (Organization for European Economic Cooperation, Paris, 1954), p. 36.

accounts. In a single-currency agreement, the currency of account may be the currency of either partner, or a third currency, frequently the U.S. dollar and less frequently sterling or the Swiss franc. Although such pacts usually provide for a single account, there may be accounts in both partner countries. In a dual account agreement, each account is usually in the currency of the country where it is held, but infrequently both accounts are in U.S. dollars, sterling, or even the currency of one of the partners. And apart from this distinction between dual and single accounts, payments may be either centralized or decentralized. In the latter case, authorized banks are permitted to carry subaccounts.[7]

Settlements in convertible currencies or gold have to be made only when one partner's net debtor position in the designated accounts exceeds an amount established in the agreement as the limit up to which each partner is prepared to sell its currency for the other's currency without demanding cover. This reciprocal credit margin is frequently referred to as the "swing" (also "manipulation credit," "reciprocal revolving credit," or "working balance"). It provides each central bank with a *masse de manoeuvre* in the other's currency. The "swing" is usually established after taking into consideration the volume and timing of reciprocal trade that is expected in the next few years, and theoretically it should be sufficient to prevent the need for convertible settlements in connection with overdrafts which might be caused by seasonal deliveries, strikes, and other irregularities. In some agreements, the swing ceiling is a "gold point" or "dollar point," where the creditor is entitled to require settlement of the excess in gold, U.S. dollars, or a currency acceptable to the creditor; even where the swing ceiling is a "dollar point," its impact is sometimes softened by a reservation that the excess overdraft does not become payable until the swing has been exceeded continuously over a specified period, e.g., three months. It is sometimes stated explicitly that, if the swing is exceeded, the creditor party is entitled to restrict the licensing of exports to the debtor. In other cases, the swing is a "talking point," requiring discussion of corrective measures but not entitling the creditor country to ask for instant and full settlement of the excess overdraft in convertible exchange or gold. In some cases the swing is lopsided, one partner being obliged to accept a higher claim than the other, or it may be unilateral rather than reciprocal. A few agreements have also been noted in which no swing ceilings are indicated.

The reciprocal swing margin is an essential characteristic of the typical

[7] Regardless of the number of currencies used and irrespective of any decentralization, there may be a system of multiple accounts under which various types of account are set up for various categories of transfer. Such systems have been frequently used where part of one partner's export proceeds is reserved for the liquidation of claims held by the other partner.

bilateral payments agreement. It does away with the "waiting period" which frequently occurred under interwar clearing agreements, where the exporter could not be paid in his own currency until importers in the same country had paid sufficient amounts in that currency to the clearing office.[8] The swing therefore permits uninterrupted trade. Because out-payments need no longer be effected in chronological order, the swing also permits decentralization, with the commercial banks carrying subaccounts and providing their usual financing facilities, in contrast to the centralization of all clearing payments in a compensation office. More important than these technical characteristics, however, are some of the policy implications of the signing of a payments agreement. The assumption that no convertible exchange need be involved in the financing of their reciprocal trade permits both partners to base their discriminatory trade and exchange policies on their pattern of payments agreements. If trade between the two countries previously was financed in dollars, the signing of the agreement normally will be sufficient to eliminate the partner country from the inconvertible country's exchange control definition of the dollar area, and the swing credit provides each party with accommodation in the other's currency and thus may function as a pump-priming device; if one raises its purchases, the other may be induced to do likewise, and a bilateral expansion of trade may result.

Even where a swing is included, the agreement may provide for periodical settlement in gold or dollars of net balances (sometimes limited to net extra-swing balances). For example, it is envisaged that such periodical settlement will be made on June 30 of each year under the Japanese-Indonesian payments agreement, and quarterly under the agreement between Japan and Sweden. Provisions of this type tend to limit the dollar-saving character of a payments agreement. So do interest clauses and other penalty clauses which under some pacts render costly any lengthy occupation of a substantial portion of the swing. The swing usually relates only to in-payments and out-payments registered on the agreement accounts. Any commercial or banking credit obtained or given is additional. This may be of importance where large amounts are involved, as in the credits repeatedly granted by London commercial banks for the financing of French and Austrian imports of raw wool, or in the export credit extended by European exporters to importers in underdeveloped countries.

Another basic provision in a typical payments agreement specifies the

[8] Since 1952, however, the Bank deutscher Länder has occasionally instituted a "waiting room procedure" for claims on countries that had overdrawn their swing ceilings without covering the excess overdraft in the manner prescribed. Other countries also have sometimes suspended the full and immediate settlement of their exporters' claims on account of exports to excessive debtor countries.

exchange rates to be applied by the partner countries to each other. In most cases, the two currencies are related to each other at the middle rates for the U.S. dollar, or the rate of one currency is established directly in terms of the other and in line with the official par values, so that the exchange rate between the two currencies is generally stable, and the various bilateral exchange rates thus officially defined usually contain no broken cross rates.[9] In trade with a country employing explicit multiple rates, the use of the U.S. dollar or the unitary currency of the partner country as the agreement currency leaves the former free to determine the rates at which it will convert domestic currency into the agreement currency, and vice versa, in respect of different types of transaction. But that freedom may be restricted by clauses guaranteeing the partner country nondiscriminatory treatment in exchange rate matters. A separate clause usually permits the two central banks to work out technical details; these include the spreads to be maintained between buying and selling rates.

Other important provisions of a payments agreement indicate the types of underlying transaction which are to be financed in accordance with the terms of the agreement. These usually cover all commercial payments, including incidental charges, although some agreements, in particular many Latin American agreements, exclude transit trade by defining trade as the exchange of goods originating in and consigned from one partner country and having their final destination in the other, where they must either be absorbed into domestic consumption or be processed. Transfers on capital account in nearly all cases require previous consultation. Current transactions that have frequently been excepted are capital earnings, capital amortization, and various invisibles, such as certain insurance payments. In Egypt's payments agreements, one of the crucial points is whether Suez Canal dues may be settled through the agreement accounts or must be paid in dollars or sterling. Specific payments agreements, however, may be of much narrower scope than the usual type. It is sometimes expressly provided that certain exports continue to be settled in U.S. dollars, as German coal was under the early postwar agreements. The agreement most limited in coverage appears to be one between Argentina and Mexico under which only sales of books and periodicals may be financed while all other payments continue in convertible exchange. Most payments agreements are based on the so-called residence principle according to which transfers based on the agreed types of transaction may be effected between residents of the partner countries regardless of the origin of the claim.

[9] Exceptions are, for example, certain Egyptian payments agreements which provide that some types of transaction shall be settled in the partner's currency at the fixed rate which corresponds to the official par values, whereas other payments are made in Egyptian pounds at a fluctuating rate.

The origin principle, on the other hand, restricts transfers through the agreement accounts to claims of national origin—in the case of commodities, therefore, to direct trade in goods originating in the monetary areas of the two partner countries. The difference is also important as regards financial remittances.

Payments agreements often contain clauses regarding devaluation guarantees on outstanding balances and the liquidation of such balances if the agreement is terminated. Where such provisions have been either absent or unsatisfactory, the result occasionally has been a marked unwillingness to hold claims on the partner country or to allow the partner country to run up a significant claim. The resulting difficulties in the functioning of specific payments agreements, although also important in Europe, have been manifest particularly in relations between certain South American countries and some of their European partners. Cases have occurred, for example, where both partners to a payments agreement treated each other as a dollar area country and issued import licenses very sparingly—one partner because it considered the termination clauses an incentive for the other to insist on liquidation of any large balance outstanding, the other partner because its import requirements were likely to exceed export proceeds considerably if these continued to accrue at the old rate. The desire for satisfactory exchange guarantees appears to have been one of the main reasons for the increasing use of the U.S. dollar as the currency of account in bilateral payments agreements.[10] With regard to the exchange guarantee affecting balances arising during the validity of the agreement, there is a choice between insuring a credit balance only against depreciation of the debtor's currency and providing also for readjustment if the creditor's currency is depreciated or appreciated or the debtor's currency appreciated. There is also a choice between gold and the U.S. dollar as the standard of reference. Moreover, there are the technical questions of whether and how to take account of the spot balances of commercial banks and any outstanding forward exchange transactions, and of letters of credit outstanding and payment orders registered in only one of the partner countries. The exchange rate guarantee also has implications on the national level. Since usually the central bank, acting as the agent of the government, signs the payments agreement, or at least holds agreement balances, provision must be made for the sharing of losses and profits on agreement balances (including any balances in the domestic currency) as well as the sharing of any interest earnings and expenditures.[11]

[10] Considerations of prestige also are likely to have been involved, particularly where only one partner's currency could be used as an accounting unit since the other country applied an explicit multiple rate system.

[11] The swing credit may also have to be readjusted in proportion to variations in the exchange rate.

Frequently clauses are included that indicate the currencies in which invoices should be expressed and that determine the method by which the currency of invoicing is to be reduced to the currency of account. Under many agreements, traders on both sides are explicitly permitted to invoice in any currency they choose while, under others, invoicing in the agreement currency or currencies is prescribed. The matter is of general importance from the point of view of the exchange rate risks involved in the transactions of private traders, and therefore may affect competitiveness with prices quoted by exporters in third countries. Under dual currency agreements, the invoicing arrangements are likely to affect the actual use of the currencies in which the agreement accounts are expressed. The preference of private traders in regard to invoicing is largely an institutional datum and must therefore be taken into account both in negotiating specific payments agreements and in deciding policy issues affecting the character of a country's exchange rate, particularly the choice between a fluctuating and a stable rate.

Many payments agreements have to define the monetary areas to which their provisions will apply. The U.K. monetary area comprises all "Scheduled Territories," i.e., the entire sterling area. The agreements of various other West European countries cover their dependent overseas territories which are included in the respective monetary areas. Under the agreements of the BLEU, Belgium and Luxembourg act as one partner. Liechtenstein is included in the Swiss monetary area, and Indonesia often in that of the Netherlands.

Although payments agreements primarily affect settlements between the two partner countries, many agreements contain provisions permitting, subject to mutual approval, the use by either country of a claim on the partner country to make settlements with third countries.[12] Such clauses formally make inconvertible currencies transferable among inconvertible countries. The best-known and most significant types of transferability are those established in the EPU arrangements and sterling transferability. In the EPU, the plurilateral compensation of all bilateral net positions on the accounts of the central banks implies the complete transferability within the group of all claims accruing to any one member on any other member, to the extent that those claims are admitted under their respective payments agreements. Except for the sterling and EPU arrangements, however, the transferability of inconvertible currencies among inconvertible countries in accordance with provisions of the type referred to has, in practice, been negligible.[13]

[12] The early postwar agreements sometimes contained clauses providing for the possibility of third countries joining the agreement, subject to the consent of both parties, and usually they left the way open for both countries to join international monetary agreements after mutual consultation.

[13] There have, for example, been some transfers of Latin American payments agreement balances among EPU members, some of these under a standing arrange-

Regardless of whether or not it has been laid down in the agreement, certain goods have continued to be traded in U.S. dollars even between countries linked by a payments agreement.[14] Thus trade in Spanish rice, Norwegian nickel, and Chilean copper has frequently been settled in U.S. dollars. This tends to create problems of commercial policy, since the buying countries will tend to put the country of origin under pressure to permit such sales under the terms of their payments agreements; they may do this by refraining from direct purchases and either buying on a transit basis or shifting to other suppliers. If they do not take such counteraction, their sales to the dollar-earning country are likely to suffer, since the dollars involved are almost certain to be spent in the dollar area instead of in the importing countries. With the worldwide increase in production and the spread of payments agreements, dollar commodities have tended to become softer. On March 4, 1950, the Tokyo *Oriental Economist* could still write, "Goods like Egyptian long staple cotton and Chilean copper and saltpetre that are exportable for dollars are being referred to as 'hard' commodities and are often excluded from trade agreement items. India's control over cotton exports in an attempt to restrict sales to hard currency areas only and our own preference regarding purchases of steel ships are examples of the general scramble for U.S. dollar earnings . . . ." All these commodities have since become much easier to acquire under payments agreements. Even some Chilean copper from the large mines is now being sold for soft currencies—for example, under the payments agreements with Argentina, Spain, and Italy—and in 1954 it was occasionally available against payment in sterling.

Many bilateral payments agreements (or the accompanying trade agreements) provide for a mixed commission composed of representatives of both countries. These commissions are charged with supervising the functioning of the agreements and with preparing the negotiations for the next trade agreements. Under certain payments agreements, the commissions are convened as soon as a specified proportion of the swing has been occupied by one partner over a specified maximum period. They have made significant contributions to smoother trade and payments relations under specific agreements. Of course, the appointment of such commissions depends, to some extent, on the availability of staff in embassies and legations in partner countries. Mixed commissions have only gradually become a usual feature of Latin American agreements,

ment created by the EPU specifically for transfers of Latin American currencies. Over the last two or three years, free market transactions in so-called clearing currencies have provided some additional transferability of payments agreement balances.

[14] This practice was particularly widespread at the time of the boom resulting from the outbreak of the Korean conflict, and the OEEC then attempted to reduce the scope of the practice between OEEC member countries.

presumably since European diplomatic representation in South America has expanded.

As stated above, the European Payments Union is based on an agreement concluded by 18 European countries, the members of the OEEC, in which they undertake to offset periodically among themselves all bilateral credit and debit agreement balances of their central banks arising from agreed payments made and received in the currencies of the participating countries. Thus there is full transferability within the group of the currencies of the member countries. Convertibility, on the other hand, exists only to the extent that gold and dollar settlements occur. As long as countries are within their "quotas," these settlements are limited to specified proportions of the countries' over-all creditor or debtor positions. Excessive debtor positions must be settled fully in gold or dollars, whereas excessive creditors are paid in gold or dollars for only part of their surpluses, and have to grant credit for the remainder in accordance with various "rallonge" arrangements. The quotas are comparable to the swings in bilateral payments agreements since they determine the maximum deficits and surpluses that can be accommodated under the agreement.[15]

The signing of the EPU agreement in 1950 rendered inappropriate certain features of the previously existing bilateral payments agreements among the European countries, but modified payments agreements are now in force between all pairs of those EPU countries which have individual quotas. These bilateral payments agreements are still necessary for various technical purposes. From the accounting point of view, the agreements are indispensable since members have an obligation to furnish the Bank for International Settlements with monthly data on all bilateral positions, from which the net over-all positions are then determined. The agreements also define the partners' exchange rates, list the types of transaction between each pair of countries which are to be settled through the EPU mechanism, and contain provisions regarding the steps to be taken in the event that either country leaves the EPU or the EPU is terminated. Bilateral swing margins, on the other hand, are now unnecessary. More basically, the agreements still provide the legal basis for accepting and holding the currencies of the participating countries during the intervals between accounting dates.

Trade agreements

The bilateral trade agreements of the postwar period are, of course, short-term agreements in which partners enter into certain commit-

[15] Three participants have not been assigned an individual quota. Ireland is included in the sterling area, Luxembourg in the Belgian monetary area, and Trieste in the Italian monetary area. Trieste was a member of the OEEC until the absorption of its territory by Italy and Yugoslavia.

ments mainly or exclusively regarding their reciprocal trade. The usual period of currency is one year. The predominant type is that between inconvertible countries where each government commits itself to issue upon application import licenses to specified value or volume limits for certain listed exports originating in and shipped from the other country, and to issue export licenses for its own export products similarly listed. Occasionally, the quotas are not confined to direct trade. Coffee quotas in East-West trade are an example of transit trade quotas. Because of the balance of payments aspect involved, quotas are preponderantly value quotas rather than volume quotas; the latter are more appropriate for the implementation of protective policies and of allocation schemes for scarce commodities. Another consideration is that value quotas provide a stronger incentive for exporters and importers to trade at low prices. Unless state trading is involved, the quotas are permissive rather than binding, since they constitute a licensing commitment instead of a purchase commitment.[16] In some cases, not even permissive quotas seem feasible, and indicative lists of export and import commodities are agreed instead. Correspondingly, the total volume of trade scheduled in a trade agreement may represent either a minimum target or an estimate. Scheduled quotas are not exhaustive in the sense that either partner is not free to license imports and exports of listed goods over and above the agreement quotas, or of goods for which no quotas have been established, but the other partner is not obliged to grant additional export or import licenses for them. Usually, the trade is to be financed under a bilateral payments agreement, the totals of the quotas for a year being approximately balanced in order to keep net payments positions within the swing limits. There is sometimes a planned discrepancy between the totals which is intended to cover invisibles, transit trade, capital investment, or debt liquidation.

Bilateral trade agreements may contain provisions relating to many other matters. They may, for example, contain quotas for invisibles, such as exchange quotas for tourist travel in the partner country, or provisions regarding transit trade, insurance, shipping, the treatment of investment income, and taxation or immigration matters. Some trade agreements, for example, various Anglo-Argentine pacts, have amounted on one side to government purchase programs, with qualities, prices, packing, etc., specifically defined. Price provisions other than a general undertaking that there shall be no discriminatory treatment of the partner country are, however, rare. Among EPU countries, the progressive liberalization of intra-EPU imports has steadily reduced the length of

[16] Even a permissive quota may be described as binding in the sense that it commits the partner countries to issue licenses applied for. In contrast, some looser agreements contain quotas that constitute only targets or estimates of trade, or even simple indicative lists of commodities (without quotas) which it is expected will be exchanged.

the quota lists, since import licensing commitments are needed only for nonliberalized products and for purchases from and sales to the nonmetropolitan areas, whereas export commitments can be dispensed with except for goods subject to allocation or restrictive export licensing. Since 1951, bilateral trade agreements between highly industrialized countries and less industrialized or underdeveloped countries have increasingly included clauses regarding supplies of capital goods on deferred payment terms. In such cases they become similar to credit or investment agreements. Conversely, trade agreements may implement the amortization of a bilateral debt through an export surplus. Agreements of this type, in which an underdeveloped country is the debtor, assumed increasing importance after 1952. Some trade agreements with such countries enable certain exports to continue under additional credit arrangements, while at the same time a portion of the creditor's import payments is set aside to collect overdue claims. Agreements that formally are trade agreements only, sometimes contain financial clauses which in their effects are equivalent to those of a payments agreement. That is the case, for example, where country A's proceeds from sales to country B must be received in the currency of B and may be used only for direct imports from B.

Trade agreements usually exclude private compensation transactions unless approval of any specific deal is obtained from the authorities on both sides. Nevertheless, under certain pacts, particularly with East European countries, all or most of the transactions under a trade agreement have been effected on a so-called compensation basis. Italy has made much use of so-called reciprocity, or parallel, transactions which represent private compensation with settlement both ways through the accounts established by virtue of the payments agreement in force with the partner country. Compensation and reciprocity have been resorted to mainly for three purposes: to offset unfavorable export prices, to limit the accrual of bilateral balances, and to ensure that goods of equal "hardness" are received in return for the exports licensed.[17] This last consideration in particular has frequently caused import and export licenses for extra-quota transactions (including transit trade) to be given on a compensation basis, even where most of the partners' reciprocal trade has been realized in independent sales.

Most bilateral trade agreements either supplement a bilateral payments agreement or are between a pair of OEEC countries, though there are also some bilateral trade agreements between "dollar countries" and inconvertible countries not linked by payments agreements,

[17] Particularly in trade with the dollar area, countries favoring compensation and reciprocity transactions often have prescribed the observance of a certain minimum ratio between export proceeds and import payments in order to have some net accrual of foreign exchange (*Devisenspitze*).

and their number has been growing. Thus Cuba and Colombia, which have concluded few payments agreements and are "dollar countries" to most of their inconvertible trading partners, have entered into various trade agreements under which European partner countries are granted certain import privileges in exchange for purchase commitments for listed Cuban or Colombian exports. The import privileges granted by Colombia since 1949, when it greatly simplified its exchange rate structure and its system of quantitative restrictions, usually have consisted of exemption from the provisions of a prohibited import list, while those given by Cuba generally have been tariff concessions. Since February 1954, Colombia has permitted the import of commodities previously on the prohibited list, but only from countries with which it had either a trade or payments agreement or an approximately equilibrated balance of trade. Imports of goods required for the execution of public or semipublic contracts were limited to the same groups of countries. Under the Colombian and Cuban trade agreements, settlements continue to be made in convertible currency unless, as happens only rarely, a bilateral payments agreement has also been concluded.

Whereas the nature of trade agreements requires frequent renegotiation, with account being taken of changing supply and demand conditions, bilateral payments agreements do not require repeated revision and may remain in force with little or no change for several years, although swing provisions in particular have often been revised. Sometimes, however, a trade agreement and a payments agreement formally constitute a single instrument; that is true, for example, of many Argentine agreements. Changes in either set of provisions are then usually implemented through supplementary protocols to the original trade and payments agreement.

In Europe the OEEC countries started in 1949 a program of relaxation of trade and exchange restrictions among each other. The liberalization rules for trade and invisibles may be viewed as in fact constituting a plurilateral, regional trade agreement.

Institutional changes since the war

The institutional arrangements described above show some significant changes from the practice of the 1930's, when a considerable number of clearing agreements and similar arrangements were also concluded. Most of the arrangements of the 1930's were between European creditor countries and either European or South American debtor countries. With the single exception of Germany, which had clearing arrangements with most European countries and also the aski-mark procedure for financing trade with Latin American countries primarily, payments relations among the major European countries remained on a convertible

basis, as did those between all European countries and the United States and Canada. Late in 1937, 170 clearing agreements and similar agreements were in operation,[18] including those of the Baltic border states and Danzig.[19] Of these, around 20 were so-called payments agreements under which the use of convertible exchange continued. By January 1939, the United Kingdom, France, Switzerland, Belgium-Luxembourg, and the Netherlands were each party to around ten payments or clearing agreements.[20] Thus clearing arrangements were far less widespread than the postwar payments agreements, although the element of bilateralism in the employment of import quota systems (often on the basis of formal bilateral agreements) was considerable, and although some countries (for example, Germany and Turkey) were parties to a large number of clearing agreements. Countries such as the United Kingdom, France, Belgium-Luxembourg, or Switzerland might subject their trade relationships with each other to quota agreements, but they did not subject payments with each other to clearing. While in the 1930's a large proportion of world trade continued to be financed in two convertible currencies, sterling and the U.S. dollar, most international trade is now financed in a large variety of inconvertible currencies, of which sterling is by far the most important.

How clearing arrangements gradually became important for the major trading nations of Europe in their relations with various debtor countries may be inferred from the Swiss experience.[21] Switzerland signed two of the first clearing agreements ever negotiated, those with Austria on November 12 and Hungary on November 14, 1931, the year in which France introduced the large-scale use of import quotas.[22] Clearing agreements with Bulgaria and Yugoslavia were signed in 1932; with Rumania, Greece, and Turkey in 1933; and with Chile in 1934. Two agreements with Germany regarding transfers of capital earnings and of certain commercial payments were signed in 1933, but, effective August 1, 1934, a bilateral agreement submitted all payments between the two countries to a clearing regime from which only capital and insurance transfers

[18] Kurt Schneider, *Der Welthandel im Clearingverkehr* (Zürich, 1938).

[19] Danzig, Estonia, Latvia, and Lithuania accounted for 22 of these arrangements.

[20] In the period 1931–38, the United Kingdom entered into such arrangements with Argentina, Brazil, Germany, Hungary, Italy, Rumania, Spain, Turkey, Uruguay, and Yugoslavia. See National Institute of Economic and Social Research, *Trade Regulations and Commercial Policy of the United Kingdom* (Cambridge, 1943), pp. 179 and 214–15, and Henry J. Tasca, *World Trading Systems* (Paris, 1939), Chapters IX and X.

[21] Office suisse de compensation, *Rapport de gestion, 1949* (Zürich, 1950), pp. 5–19.

[22] The first clearing agreement ever to be concluded appears to have been that between Czechoslovakia and Hungary, signed on October 31, 1931. Cf. Howard S. Ellis, *Exchange Control in Central Europe* (Cambridge, Mass., 1941), p. 81.

were excepted. After the establishment of the Swiss Compensation Office late in 1934, bilateral payments arrangements came into being vis-à-vis Italy (1935), Brazil (1936), Spain (1936), Poland (1936), Nationalist Spain (1937), and Iran (1938). At no time before World War II did Switzerland have more than 14 clearing systems in force. At present, in contrast, Switzerland has payments agreements, clearing agreements, or similar arrangements with 26 countries. In two years alone, 1945 and 1946, it signed 12 new payments agreements, and by the end of May 1947 it had 19 such agreements in force.

The experience of other European countries has been similar to that of Switzerland. At the end of 1946, France was a partner to 20 payments agreements, Belgium to 17, and the Netherlands to 14. By June 1947, 200 bilateral payments agreements were estimated to be in effect.[23] Since then, the growth of the network of payments agreements has been less spectacular, but their number has never ceased to increase. Thus the number of Netherlands payments agreements and similar arrangements had risen to 20 by the end of 1953, in addition to those concluded with the OEEC countries, while Western Germany at that time had concluded 17 agreements with non-OEEC countries.

A second distinction between the interwar and postwar periods is that in the 1930's restrictions on resident convertibility were implemented to a greater extent through unilaterally imposed nondiscriminatory import and exchange quotas, rather than bilaterally agreed quotas, and that there was no plurilateral liberalization of quantitative trade and exchange restrictions.

Thirdly, there were important exceptions to convertibility on resident account in most major trading countries, but in virtually all of them the distinction between convertible and inconvertible currencies was largely academic, and usually there was substantially full resident convertibility, both on current and capital account, vis-à-vis the United States and Canada. Although import quotas discriminated between commodities, between countries, and between currencies, such discrimination was not applied for hardness-of-currency reasons except where it served to affect the functioning of bilateral clearing arrangements. Under the latter, the main problems (from the creditor's viewpoint) were how much should be imported from those countries in order to feed the clearing, and how to allocate the balances resulting from those in-payments to exporters and investors, respectively. The first of these questions generally required a decision as to the specific commodity imports that should be controlled in order to safeguard domestic employment. The creditor had two conflicting interests: to protect employ-

[23] Bank for International Settlements, *Seventeenth Annual Report* (Basle, 1947), p. 75.

ment by stimulating exports to, and reducing imports from, the partner country; and to provide the finance for exports and capital earnings by importing more.

A fourth major characteristic of the 1930's was that, after the devaluation of sterling in September 1931, many of the major trading nations employed fluctuating exchange rates, into which only the Tripartite Agreement of 1936 brought orderliness, whereas in the postwar period most major currencies have had fixed official exchange rates with correct cross rates. In addition to the relevant commitments under the Articles of Agreement of the International Monetary Fund, most bilateral payments agreements provide for fixed exchange rates. This tends to reduce the ability of countries to manipulate exchange rates; and in many payments agreements, exchange guarantees provide a further deterrent to such action. Clearing agreements, furthermore, often created explicit broken cross rates, while a considerable volume of compensation trade involved further deviating cross rates of an implicit or explicit character.

Finally, the bilateralism under clearing agreements and similar arrangements in the interwar period probably was stricter than that of the postwar years, which have been characterized by various types of transferability (sterling transferability, ERP drawing rights, multilateral compensation of bilateral payments positions in the EPU) and of regional adaptation of exchange policies and commercial policies, and during which governments have deliberately and jointly striven toward monetary multilateralism (in accordance with the IMF Articles of Agreement) and commercial multilateralism (under the rules of the General Agreement on Tariffs and Trade).

Purposes of Payments Agreements and Trade Agreements

Payments agreements of the postwar type began with the Belgo-Dutch (1943) and Anglo-Belgian (1944) payments agreements.[24] Toward the

[24] The origin of these agreements may be traced back to certain interwar clearing agreements with provisions similar to swing clauses, and to the Franco-British monetary agreement of December 4, 1939. The official communiqué summarizing the so-called Simon-Reynaud agreement opened as follows: "(1) The two Governments have agreed that it is in the interest of both countries to avoid alterations in the existing official rate of exchange between the pound and the franc. (2) The francs required by the United Kingdom (including those for the British Expeditionary Force) will be provided against payment in sterling, and the sterling required by France (including that required for the purchase of raw materials in the British Empire) will be provided against francs. Both countries will, for the duration of the war, be in a position to cover the whole of their requirements in the currency of the other country by payment in their own currency without any question of their having to find gold. (3) The sterling held by the French monetary authorities will be available for expenditure throughout the sterling area, and the francs held by the United Kingdom monetary authorities will be available for expenditure throughout the French Empire."

end of 1944, the United Kingdom started negotiations with a number of continental countries with a view to the signing of payments agreements, several of which were concluded between October 1944 and May 1946, namely (in chronological order) those with Belgium, Sweden, France, Denmark, the Netherlands, Czechoslovakia, Norway, Switzerland, and Portugal. These and other continental countries also signed similar agreements among themselves. They were acceptable as emergency devices because of their technical superiority over the interwar clearing arrangements as a result of the elimination of the waiting period and the decentralization of payments. Except for the U.K. pacts, most of them were accompanied by one-year trade agreements establishing bilateral import and export quotas.[25]

The incentives for European countries to enter into such bilateral payments agreements and bilateral trade agreements were partly commercial and partly financial. The negotiation of trade agreements may be viewed as "the opening of a door to the world abroad" by countries still cut off from each other and which had prohibited all transactions with nonresidents unless specifically authorized by a special or general license. Postwar shortages of nearly all kinds of goods made it imperative to obtain essential supplies from other countries. It was natural that bargaining for these supplies should develop. The results of the bargaining were laid down in bilateral trade agreements. The war had imposed heavy losses of monetary reserves on most European countries, which were, therefore, anxious to economize in the use of convertible exchange and gold, while the countries with stronger reserve and balance of payments positions could support their exports by granting tied credits to various European countries. Countries may also have intended to further the use of their own currencies in international trade by entering into payments agreements, and to fix their exchange rates vis-à-vis their main European trading partners. Once a number of important payments agreements had been signed, countries had an incentive to conclude additional agreements of this type. First, the agreements offered a means of obtaining or giving a tied credit. Second, countries that already had payments agreements adopted import licensing techniques and policies discriminating against the dollar area and favoring their bilateral payments and trade agreement partners. After the war, the United Kingdom at first assumed a position different from that of other European countries in that it made little use of bilateral trade agreements. However, after the attempt to establish convertibility of sterling in 1947, the United Kingdom also concluded a number of trade agreements with countries with which payments agreements already were in force, and expanded the number of its payments agreements.

[25] On the genesis of the postwar payments agreements, see J. W. Beyen, *Money in a Maelstrom* (New York, 1949), Chapter IX.

In the 1930's it had become apparent that in most countries commercial policy was no longer a matter mainly of import tariffs. Of course, there still was a tendency for tariffs to be raised where quantitative import restrictions—for instance, because of the dualism in their use as a barrier to keep out imports and as a bargaining counter to push exports—were unable to protect employment sufficiently, or did not satisfactorily relieve the pressure on the balance of payments. But commercial policy and exchange policy went hand in hand, while customs tariffs tended to assume secondary importance where import quotas were highly restrictive. Both clearing systems and import quotas were manipulated in such a way as to stimulate exports and to protect agriculture and manufacturing industries against imports that threatened to increase domestic unemployment. A similar mingling of commercial policy and exchange policy became evident when, soon after World War II, inconvertible countries used payments agreements and trade agreements as instruments for the joint implementation of discriminatory trade and payments policies. The emphasis everywhere was on the balance of payments aspects of these policies, whereas in the earlier period the employment motive had been predominant in the creditor countries. The latter had tried by means of quota systems to prevent the importation of deflation and unemployment, and had striven to offset their imports with equivalent exports by subjecting their payments relations with debtor countries to clearing arrangements. The postwar systems of payments agreements may rather be viewed as instruments to influence, through the prescription of currencies for inward and outward transfers, both the level and the composition of monetary reserves; only in a few countries with strong monetary reserve and balance of payments positions was the accent on the maintenance of exports and employment.

In the use of bilateral agreements, certain "rules of the game" soon evolved, especially with regard to swing overdrafts, differences in the treatment of essential and nonessential commodities, and the use of compensation transactions. Most of the early payments agreements provided for multilateral use of bilateral balances, but in practice this has been of limited significance except for sterling. Similarly, whereas most agreements provide that settlement in respect to extra-swing overdrafts can be effected in any currency acceptable to the creditor country, such settlement, where insisted upon, usually has to be made in gold, U.S. dollars, or free Swiss francs, although much sterling also is used. But creditor countries have frequently found it advisable to grant their debtors special facilities rather than to require settlement in convertible exchange, since another "rule of the game" is that debtors will limit the use of convertible currencies by stopping imports when swing

credits threaten to be exhausted, or incur arrears rather than produce dollars. The trade involved in compensation transactions has usually been "additional," i.e., either covering extra-quota imports and exports or involving goods that could not be exchanged without some price connection. The distinction between essential and nonessential goods causes countries to watch each other's import licensing policies closely and to make purchases of nonessential goods and sales of essential goods dependent on sales of nonessential goods or on the partner countries' exports of essential goods. Industrialized countries are unlikely to make capital equipment available to underdeveloped countries on attractive credit terms unless they also are able to sell consumer goods. It is difficult to extend a special favor to one country without extending it to other agreement countries. Thus, essential exports have to be allocated equitably between the various bilateral partners in order to avoid retaliation by countries that might be hurt by low export quotas. Similarly, if importers are permitted to import a certain nonessential commodity from country A, it is difficult to refuse licenses for such imports from country B; and if an overpriced export commodity is offered to country C on a private compensation basis, it normally has to be offered to country D on the same basis.

The European experience with payments agreements and trade agreements in the early postwar years may be summarized as follows.[26] In the first year, the agreements permitted a quick revival of trade; in the second year, many swings were used continuously in the same direction, and countries therefore attempted to negotiate trade agreements more likely to lead to equilibrated trade; in the third year, the difficulties of reaching bilateral equilibrium proved insurmountable because of such factors as leads and lags in trade, the impossibility of estimating invisibles accurately, unsatisfactory exhaustion of trade agreement quotas, etc. At that stage, "drawing rights" were created to keep the flow of trade going and prevent the network of European payments agreements from breaking down. These drawing rights kept the life lines open until 1950, when the European Payments Union was created. Meanwhile, the pattern of agreements grew increasingly more complex. For one thing, the negotiation of payments agreements tends to work as a cumulative process. For the sake of illustration, a "dollar" country such as the Philippines may be taken. If the Philippines had entered into a payments agreement with, for example, the United Kingdom, and consequently

[26] See F. A. G. Keesing, "Intra-European Payments," *Quarterly Review* (Amsterdamsche Bank, Amsterdam), October 1949, pp. 1–14. A detailed description is given in William Diebold, Jr., *Trade and Payments in Western Europe: A Study in Economic Cooperation, 1947–51* (New York, 1952). For an exhaustive analysis of the original EPU arrangements, see F. A. G. Keesing, *De Europese Betalingsunie* (Amsterdam, 1950).

had been shifted from the American Account to the Bilateral Account group under the U.K. exchange control regulations, other inconvertible countries would have had a double incentive for reducing their direct purchases in the Philippines. First, they probably would have been able to buy certain Philippine commodities for sterling from commodity dealers in Hong Hong, Singapore, or London. Second, by reducing their purchases from the Philippines they might seek to place pressure upon the Philippines to conclude a payments agreement, so that they would be in no less favorable a position than the United Kingdom.

As soon as a dividing line was drawn between convertible and inconvertible countries, both had an incentive to conclude additional payments agreements, since their desire was to cut gold and dollar payments to nonagreement partners, or to expand export markets in nonagreement countries. In fact, an exchange incentive and a commercial policy incentive usually went side by side. Where a payments agreement was concluded, soft currency countries could limit settlements in convertible currencies and in gold to overdrafts in excess of the swing margins. Also, if a new partner country should display any marked discrimination between dollar and non-dollar imports, there would normally be prospects for larger exports to that country—particularly since either party to a payments agreement, by importing first, can force any partner country accumulating a currency that (within the swing margin) is inconvertible to shift to it as a source for some imports.[27] Conversely, there were incentives for convertible countries, particularly the smaller dollar area countries lacking a well-diversified economy, to conclude bilateral payments agreements with inconvertible countries in order to surmount the obstacle of discriminatory import licensing which in the inconvertible country was directed against dollar imports. However, such countries had an incentive to enter into bilateral trade agreements rather than payments agreements if they had simple nondiscriminatory import licensing systems under which quantitative and cost restrictions were applied to specific goods regardless of the currency in which they were payable. The creation of a direct link and a bargaining basis was also an objective of inconvertible countries in concluding payments agreements with each other despite the availability of soft currency financing facilities such as those provided by the transferability of sterling.

Consequently, the movement toward bilateral agreements became stronger after mid-1947 when the prospect of convertibility seemed to recede. The U.K. trade agreements have already been mentioned. India negotiated a large number of bilateral trade agreements after 1947, but

[27] Cf. the "import first" policy which was an essential part of the so-called Logan formula for the revision of Japanese commercial policy late in 1949.

as a member of the sterling area could finance its trade with soft currency countries in accordance with the payments agreements of the United Kingdom. Western Germany in 1948 started to conclude payments agreements and trade agreements with Latin American countries. In Japan, the SCAP (Supreme Commander for Allied Powers) embarked on a policy of bilateralism in 1948 and a number of Japanese agreements were concluded with European countries, followed in 1949 by the first series of trade and payments agreements with Latin American countries.[28] Also, European countries rounded out their systems of agreements by concluding agreements with the smaller European trading partners. The establishment as a sovereign state of Israel in 1948 (as Palestine it had been part of the sterling area) and of Indonesia in 1949 led to a further series of bilateral payments agreements.

During the last two or three years, underdeveloped countries generally have had new incentives for negotiating payments agreements. Their terms of trade deteriorated after the end of the boom that had resulted from the Korean conflict, and many of them had incurred substantial losses of reserves (including holdings under payments agreements with the United Kingdom and other European countries) owing to heavy importing on the basis of the especially high export earnings accruing immediately after the outbreak of hostilities in Korea. By concluding payments agreements, their effective monetary reserves were increased by the amount of the swings in those agreements, which enabled them to license imports more freely than could have been done in the absence of agreements.[29] Various primary producing countries also have been inclined to enter into payments agreements in order to intensify or diversify their trade with Europe—as opposed to the dollar area—and thus diversify their export outlets, or in order to facilitate sales of high-priced exports. This is true also of trade agreements. This incentive was reinforced by Europe's recuperation of its productive powers. Another incentive to enter into bilateral payments agreements has been the breaking down of previously satisfactory arrangements involving transfers of a third inconvertible currency. Thus, various industrial countries in Europe, which had regularly been concluding sales in sterling to Egypt, entered into payments agreements with that country when Egypt's available sterling holdings were greatly reduced toward the end of 1952.

[28] See Ryutaro Takahashi (then Minister of International Trade and Industry), "Trade Policies of the New Japan," *Foreign Affairs* (New York), January 1952, pp. 289–97.

[29] In its Annual Report for 1953, the National Bank of Egypt noted that the use of payments agreements made it easier to restrain excessive purchases abroad and to maintain within fairly narrow limits the disequilibrium in the bilateral balances of payments with foreign countries (National Bank of Egypt, *Report of the Fifty-Fourth Ordinary General Meeting*, Cairo, 1954).

EPU countries generally in this period have had two main reasons for maintaining their payments agreements with underdeveloped countries. They wish to avoid being treated by the latter as hard currency countries and, more specifically, to protect their exports of nonessentials.

In view of these various incentives, it is understandable that additional payments agreements have been signed in every postwar year. On the other hand, the termination of a bilateral payments agreement has been rare. The simple conclusion that may perhaps be drawn is that the incentives indicated above have usually proven stronger than the disincentives which will be mentioned below, although in 1954 both the United Kingdom and Western Germany embarked on a policy of reducing the scope of their comprehensive bilateral trade and payments arrangements. A well-known example of an agreement that has been terminated is the payments agreement between Belgium and Switzerland. This agreement, which was terminated in 1949, had to be renegotiated later, however, when it proved impossible for Belgium and Switzerland to arrive at mutually satisfactory figures regarding their bilateral positions for monthly communication to the Bank for International Settlements. In 1952 it was considered necessary to revert to settlements in convertible exchange between Western Germany and Mexico since the agreement accounts were constantly out of balance in one direction, primarily because of European export bonuses and commercial switch transactions. Other payments agreements that have been terminated and not renewed include those of Belgium-Luxembourg with Argentina (1950) and Brazil (1948), Denmark's agreements with Uruguay and Egypt (both in 1951), and those of Ethiopia with Norway and Israel (both in 1954). In recent months, Western Germany notified a few South American payments agreement partners that it wished to terminate its agreements with them in order to finance trade in convertible exchange or in partly convertible deutsche marks. Since then, the German payments agreements with Colombia and Finland have expired. On the other hand, Belgium-Luxembourg and Switzerland, which for several years had had no formal payments agreements with Argentina, were negotiating such agreements at the time this paper was written.[30]

The Transferability of Sterling

The use of inconvertible sterling is based in most cases on payments agreements concluded by the United Kingdom acting for the sterling

[30] The West German payments agreement with Spain was subsequently terminated, and payments agreements were concluded, for instance, between Japan and Turkey, Japan and Greece, Belgium-Luxembourg and Argentina. The impending termination of the West German payments agreement with Ecuador has been announced.

area as a whole. Apart from the fact that sterling is the most widely used inconvertible currency, the payments agreements of the United Kingdom are of particular interest for two reasons. First, most of the agreements with non-European countries are of the single currency type and have no swing clause. This creates problems in avoiding accumulations or shortages of sterling. Of the six South American agreements, only the Argentine pact has a swing, and this was not inserted until 1951. The dollar clause which had been incorporated in the Anglo-Japanese payments arrangements since 1947 was eliminated in 1951. It must be recalled, in that connection, that the United Kingdom did not embark on a policy of concluding bilateral trade agreements until 1948.[31] Earlier, there had been trade agreements only in exceptional cases, such as those of Argentina and Brazil. In more recent years, the United Kingdom has shown some reluctance to enter into detailed trade agreements with non-OEEC countries; a trade agreement with Brazil was not renewed, and with Japan there was a tendency to have no more than estimates of trade with the sterling area.[32] Secondly, the agreements provide for the use of sterling among third countries. Until March 22, 1954, this transferability of sterling was automatic only between countries having transferable account status, i.e., the Anglo-Egyptian Sudan, Austria, Chile, Czechoslovakia, Denmark, Egypt, Ethiopia, Finland, Western Germany, Greece, the Italian monetary area, the Netherlands monetary area, Norway, Poland, the Spanish monetary area, Sweden, Thailand, and the U.S.S.R., and applied only to direct current transactions; in all other cases, transferability was administrative, requiring the approval of the Bank of England. These transfer facilities were independent of the existence of any payments agreement between payor and payee; but, in the bilateral relationships affected, the existence of such agreements usually reduced the role of sterling in current transactions to a marginal one, apparent mainly in the oil trade, and in freight, insurance, and transit trade. The "unification" of sterling in March 1954 involved the abolition of the distinction between these two kinds of transferability, substantially all previously bilateral account sterling becoming automatically transferable regardless of the purpose of the transfer. At the same time, the rule restricting the holding of transferable accounts to banks was abolished.

[31] Cf. Harold Wilson (at that time President of the Board of Trade), "International Trade Agreements," *The Pattern and Finance of Foreign Trade* (The Institute of Bankers, London, 1949), pp. 49–67; and "Britain's Recent Trade and Financial Agreements," *Board of Trade Journal* (London), February 28, 1948 (speech by Sir Stafford Cripps, Chancellor of the Exchequer).

[32] Present U.K. policy does not favor bilateral trade agreements even of the mere licensing type except in special cases, e.g., in Eastern Europe where they form part of strategic controls and may also help the repayment of debts due to the United Kingdom.

The use of sterling is important because it provides a substitute financing mechanism between countries not joined by a payments agreement and unwilling or unable to finance their trade in dollars. Thus Brazil, before it negotiated a payments agreement with the Netherlands in 1948, could finance part of its trade with that country in sterling because of the administrative transferability rules.[33] For countries not participating in the EPU, transferable sterling has virtually been the only vehicle for multilateral clearing. Finland, for example, has used about one fifth of its sterling earnings for expenditure in countries outside the sterling area.[34] Since sterling earnings and sterling expenditures between two non-sterling area countries are totally independent of each other, the substitute mechanism has offered fewer commercial policy advantages than a bilateral payments agreement. In addition, countries using these transferability privileges have been apt to record significant fluctuations in their sterling holdings and to adapt their trade and exchange licensing policies accordingly; that is, countries holding unusually large sterling balances would limit the acceptance of transferable sterling and, instead, seek payment in dollars for their exports, while conversely they would stimulate the use of sterling in settlement of imports by refusing to pay in dollars for imports from countries to which sterling transfers could be made with the consent of the Bank of England. And if a country maintained a fluctuating rate for sterling, further uncertainties arose from the movements in the broken cross rate which at one moment might favor financing in U.S. dollars and the next in sterling.

The use of transferable sterling in automatic and administrative transfers has been affected by the extent of sterling holdings of non-dollar countries outside the sterling area, by their willingness to accept or spend sterling (which may not always be strictly related to their actual or prospective sterling position), and by the existence of bilateral payments agreements or similar arrangements among them. Thus the signing during the last two or three years of a considerable number of such pacts by Egypt, Iran, and Israel is likely to have reduced the use of transferable sterling in the Middle East, both in absolute and in relative terms. In some bilateral relationships where the administrative use of sterling would have been feasible, such use has been excluded by agree-

[33] For example, in June 1950, when Western Germany's sterling balances had been reduced to zero, the Bank of England permitted non-sterling area countries to settle imports from Germany in sterling. By March 1951, Western Germany had been able to effect additional exports on this basis, in the amount of £4 million, to such countries as Peru, Thailand, and Ethiopia, with which no payments agreements had been concluded. All of these were transactions that could not have been realized if settlement in U.S. dollars had been prescribed. (Kurt Brunhoff, of the Federal Ministry of Economy, "Westdeutschlands Handel mit dem Sterlingblock," *Aussenhandelsdienst*, Frankfurt am Main, March 8, 1951, pp. 1–3.)

[34] Klaus Waris, quoted in *Nachrichten für Aussenhandel* (Cologne), December 11, 1953.

ment between the partner countries to use convertible exchange only. This has been the case, for example, under Western Germany's agreement with Peru, and under the Japanese "cash dollar" agreements with Belgium, Peru, Spain, Syria, and Uruguay.

Effects of Payments and Trade Agreements

Payments agreements helped European countries quickly to restore their intertrade in the first postwar year. Later, in several cases, they also caused a sudden expansion in trade between countries which had previously treated each other as dollar area sources of supply. It may be said that payments agreements usually have been successful in realizing their immediate limited objectives. This has often been reflected in the annual expansion of the quotas in complementary trade agreements and in the extent to which the quotas have been completely used. However, once the agreements had served their purpose of increasing trade between the partner countries, difficulties in operation, and also adverse long-run effects, frequently became apparent.

Countries adhering to payments agreements usually employ exchange and import policies that are based on "hardness-of-currency" considerations. This implies an attempt to limit expenditures in convertible currencies and in currencies of which a country holds small balances, e.g., payments agreement currencies under agreements whose credit swing has been nearly exhausted. Payments agreements may thus be a serious impediment to the use of resources in accordance with comparative cost patterns, and increase the difficulties of realizing fully the benefits to be derived from international division of labor. Not only does inconvertibility cause misallocation of productive resources; under strict bilateralism, the level of trade is determined by the production levels and pricing policies of the weakest participants in the network of payments agreements.

One of the main economic effects of payments agreements results from the incentive which such agreements are likely to give to discrimination. By discriminatory import licensing policies, inconvertible countries tend to concentrate their purchases in other inconvertible countries and, consequently, price discrepancies may arise or be increased, the same commodity being available in convertible currencies at a price lower than in inconvertible currencies; for example, certain types of Brazilian cotton have been used as a substitute for similar U.S. cotton and have usually been more expensive. Such discrepancies, in turn, do not urgently require corrective action if high-priced commodities continue to be bought preferentially by the principal trading partners for balance of payments reasons or for commercial policy reasons. As a result, sections of the inconvertible part of the world have for some years tended to constitute

high-cost, high-price areas. Export retention quotas and other directional export promotion devices have tended to accentuate this tendency by enabling exporters in inconvertible countries to reduce their prices to countries buying in dollars. Also, as a result of official action in the partner country, importers often have been unable to obtain scarce commodities under payments agreements, and have had to acquiesce in longer delivery dates and less favorable terms of payment than are offered to importers paying in dollars. The counterpart to action on the governmental level is the response of private business. The deterioration of trade patterns is accelerated by the fact that governments cannot force private exporters to direct their sales to low-price markets. Private traders tend to shun convertible markets where prices are low and prefer to sell in payments agreement countries where the lack of competition from low-cost producers enables them to reap high profits. This aggravates the problem of excessive claims held by the stronger inconvertible countries on the weaker. Countries with a healthy domestic economy may, by trading largely with inconvertible areas such as those of the OEEC countries, import any inflation prevailing in their main partner countries. This may cause the permanent loss of markets in hard currency countries, and may contribute to the maintenance of restrictions on expenditures in convertible currencies and indirectly impede the return to convertibility.

One of the main dangers inherent in the use of bilateral payments agreements is the tendency toward a division of the country's export production into two sectors, with contrasting price and cost conditions. There is likely to be pressure to continue the production and sale of some commodities at a dollar price level, that is, a price level permitting continuing sales to the United States and other countries which settle in dollars, while other commodities are sold mainly at soft currency prices under payments agreements. This seems to be essentially what has happened in Brazil and Chile, for instance. Both have been selling one major export relatively easily for dollars (coffee and copper) and another mainly for inconvertible currencies (cotton and nitrates). In such circumstances, there is also likely to be pressure to permit broken cross rates.

Once the basic pattern of payments agreements had been established, and countries' discriminatory trade and exchange policies had been adapted to that pattern, exporters in convertible countries found that, although they were shut out of various markets, they could maintain their sales in those markets if they started manufacturing either in those countries or in other inconvertible countries linked with the markets by payments agreements. In the postwar period, some U.S. investment in, for example, the United Kingdom, the Netherlands, and Italy was in-

duced by such considerations, and so was the use in those countries of certain U.S. patents and processes. Capital movements between payments agreement partners, on the other hand, have been affected by the fact that the protection provided by the intergovernmental financing mechanism was likely to assure the continued availability of exchange for imports of spare parts, the expenditures of sales organizations, and generally the transfer of funds between parent companies and subsidiaries. This is likely to have had some bearing on the postwar tendency for European manufacturers to effect a higher proportion of their exports to underdeveloped countries on a direct basis, that is, without the intermediary of export merchants. This preference for direct selling, in turn, seems to have reduced the willingness to halt exports to countries in balance of payments difficulties, and thus appears to have contributed to the large extra-swing overdrafts observed under some payments agreements.

The composition of the monetary reserves of countries that do not find themselves in a weak external position but nevertheless start to use payments agreements has an inherent tendency to deteriorate. Since economically weaker countries tend to exhaust the swing credits rapidly, and even exceed them significantly without discharging the excess overdrafts in convertible exchange, there are likely to be illiquid claims on weaker partner countries. On the other hand, these claims will normally find their counterpart in swing debts to stronger countries with which payments agreements are also maintained. Cautious monetary authorities may then feel bound to assume that their claims represent frozen assets and that the debts are payable in convertible exchange. This suggests that inconvertible countries may in some circumstances consider it essential to require a proportion of convertible reserves in relation to total annual imports that is higher than under conditions of convertibility. In other cases, however, where bilateral debts and claims are also found side by side, the need for convertible reserves is likely to be considered less than under conditions of convertibility, viz., if there is little likelihood of a need for net use of gold and dollars under the country's payments agreements; in a convertible world, some convertible exchange would presumably be held to cover emergency requirements (or even normal swings in payments) vis-à-vis the same group of countries. Which of these considerations will be the more important depends primarily on the institutional environment. In countries running significant balance of payments surpluses with the inconvertible world, on the other hand, all bilateral positions tend to be in the same direction. Thus, Western Germany under its 17 bilateral payments agreements[35]

[35] Their number has since been reduced to 14. In addition, Western Germany has bilateral financing mechanisms for trade and payments with Eastern Germany and Rumania, as well as for a small number of transactions with Israel.

with non-EPU countries on April 30, 1954 was a creditor in 16 cases, for a total amount equivalent to US$181 million, while the total of the swings in the relevant agreements was US$191 million. Conversely, Brazil since 1952 has been a heavy debtor under practically all its bilateral payments agreements. For several underdeveloped countries, the swings of their payments agreements have constituted an elastic, but non-recurrent, secondary line of reserves. This is similar to the early European experience, when the weaker countries obtained credit in the same way from their stronger partners. These effects on the composition of reserves have sometimes served not only to intensify but also to perpetuate exchange and trade restrictions vis-à-vis convertible countries. It is only fair to add, however, that the exchange guarantees on balances earned under many payments agreements have created an element of security that was usually absent before World War II.

The existence of bilateral payments agreements has greatly complicated countries' commercial policies and has in itself been the basis for a distinction in import licensing between dollar and non-dollar countries, with discrimination against supplies from dollar resources and preferential licensing for goods from non-dollar sources. Within this group of non-dollar countries, it became necessary to apply different policies to different countries, which were also implemented primarily through trade agreements. While one country might be a non-dollar country because a payments agreement had been signed with it, it might still be a hard currency country because either a structural surplus or other exceptional circumstances made the country's exports to its partner consistently and significantly larger than its imports from that country; for instance, the Netherlands for several years ran a current account deficit against the BLEU and Argentina and had to consider both as hard currency countries, although they were linked to the Netherlands by payments agreements. Among a country's payments agreement partners, the only really soft currency countries would be those with which trade tended to be in equilibrium or even to show a surplus. Until the EPU was established, most of Switzerland's agreement partners considered it a hard currency country despite the fact that it had made available between Sw F 700 million and Sw F 800 million in swing credits. A similar attitude toward Belgium-Luxembourg and Western Germany was usually adopted by their payments agreement partners. Japan is an extreme creditor vis-à-vis Indonesia and an extreme debtor vis-à-vis Germany, and therefore encourages direct and transit exports to the latter, while applying the opposite policy to the former. The EPU arrangements subsequently simplified the participating countries' commercial policies, since the currencies of all member countries could then be considered equally hard or equally soft. Members of the EPU could

roughly classify the rest of the world in three categories, the EPU area, non-EPU payments agreement partners, and the dollar area.

The impact of payments agreements on transit trade was also great. Many countries tended to limit their payments and trade agreements to direct reciprocal trade, at the expense of traditional transit trade for which they were reluctant to grant appropriate quotas. Some traditional transit trade could not be consummated because of the different degrees of hardness of the currencies involved, particularly when the initial purchase had to be made in dollars or in a relatively hard payments agreement currency. Another obstacle was that the authorities of an intermediary country might prefer to see the partner country make transfers in respect of direct imports or the servicing of financial obligations rather than spend the intermediary's currency on transit imports. On the other hand, the existence of payments agreements together with discrepancies in price levels gave rise to commercial switch trade. In comparatively few cases was the specific implementation of over-all transit trade policy laid down in a trade agreement.

The efforts made to counter the compartmentalization of trade and certain other effects of trade and payments agreements threaten the stability implied in the fairly general maintenance of fixed official exchange rates. The technical methods resorted to are indicated on pages 378–85 of this paper.

The exchange rate problem arising from bilateral surpluses is closely related to the problem of their financing. Where export proceeds are paid to exporters subject to a surrender obligation, the payment results in a net addition to the money supply and greater liquidity of the banking system without any equivalent receipt of convertible exchange. This has led to attempts in various countries to provide for the financing of such surpluses by the domestic capital market or by the exporters themselves. In order to offset the inflationary effects of (particularly) EPU surpluses, the Swiss Federal Government has applied a policy of sterilization, under which available funds are not used to retire outstanding debt, and has resumed the limited issue of gold coins. This purpose also has been an important consideration when certain other OEEC countries resorted to the blocking of part of the export proceeds accruing in inconvertible exchange. A further aspect of interest to central banks conducting agreement accounts is that of the interest, if any, to be paid or received on agreement balances, and of the conditions to which any permitted investment of agreement balances is subject. All these matters require close and constant consultation between central banks and government departments.

Both payments agreements and trade agreements may have to be renegotiated or terminated if one partner changes its restrictive system

significantly. The existence of such agreements thus creates an element of inelasticity in countries' exchange and commercial policies. When Brazil adopted an exchange auctioning system in October 1953, all import commodities were classified in five categories, and the review of applications for individual commodities was discontinued. Consequently, trade agreement quotas lost their meaning. Previously in February 1953, when Brazil deviated from its basic unitary rate structure by permitting varying percentages of the exchange proceeds of certain slow-moving exports to be sold in a free market, this export aid could not be given to exports to countries with a payments agreement providing for cruzeiro accounts, which included Argentina and the Netherlands. With both these countries, new agreements had to be negotiated, in which the U.S. dollar was used as the currency of account.[36] The liberalization of dollar imports, e.g., cotton, may affect trade with specific payments agreement partners to such an extent as to require revision of the trade agreement, if the country that has relaxed its dollar restrictions wishes to avoid the accumulation of excessive inconvertible surpluses. The wider access to the reopened West European commodity markets may have similar effects.

One aspect of payments agreements and trade agreements that has attracted much attention is the struggle for export markets. There has been a tendency to conclude that such agreements have not given European inconvertible countries competitive advantages of strength sufficient to displace the United States and other convertible countries in the markets of third countries. But there is no proof that in a convertible world, i.e., in the absence of trade and payments agreements and of discriminatory import regimes based on corresponding "hardness-of-currency grounds," the U.S. share in Latin American markets, for example, would not have increased much more in relation to the European share than it actually has increased. The basic flaw in the line of reasoning frequently followed is that it rests on a comparison between the trade patterns of the prewar convertible world and the postwar inconvertible world. On the other hand, if the question is raised whether Western Germany's return to South American markets has been facilitated by the dense network of agreements built up by that country after the end of 1948, the answer can be only in the affirmative. By the time that the German agreements with South American countries were concluded, the latter already had based their exchange policies and commercial policies on bilateralism and on discriminatory treatment of hard currency suppliers to such an extent that it would have been well-nigh impossible to build up exports to such countries as Argentina

[36] See "Bilateral Trade Agreements," *Conjuntura Econômica* (Rio de Janeiro), May 1954, pp. 25–27.

and Brazil rapidly if the supplying country had insisted on financing its trade in convertible currencies.[37]

Problems in the Operation of Trade and Payments Agreements

Since one of the main purposes of bilateral payments agreements is to reduce the use of convertible exchange, countries tend to limit their debtor positions under such agreements to the amounts of the swings provided therein. A continuous deficit cannot be maintained, however, with a country that has traditionally run a bilateral surplus, unless the debtor country is prepared to settle deficits in dollars regularly, as has been true, for example, under the Franco-Peruvian payments agreement.[38] Since such persistent imbalance in bilateral relationships has sometimes shown itself even where payments agreements had been negotiated, the accounts have in many cases become lopsided and trade between the partner countries has come almost to a standstill. Many inconvertible European countries were faced after 1951 with what is referred to in Denmark as "the third country problem," arising from a pattern of excessive claims on most bilateral payments agreement countries, the main non-EPU, non-dollar countries. The problem is especially disturbing when the creditor is at the same time faced with a current deficit against the dollar area, which would be alleviated if the bilateral surpluses could be converted into dollars, or when a country, such as Finland which is not a member of EPU, is in need mainly of European continental currencies but acquires large claims on East European countries while going into debt under its West European payments agreements.[39] Western Germany's problem is different in degree because the German over-all balance of payments surplus is composed of surpluses with the three currency areas: the dollar area, EPU, and the bilateral agreement partners. This is also true of a few other creditors in the EPU. The United Kingdom, on the other hand, because of the nature of its payments agreements with non-OEEC countries, has not acquired extra-swing claims on them; these partner countries have tended to run down their sterling holdings and thus incur commercial and financial arrears. It is too early to say to what extent these "third country problems" are due essentially to long-run changes in the terms of trade between in-

[37] See Hans Joachim Mangold, "Es indispensable un tráfico vinculado de pagos," *Handelsblatt* (Düsseldorf), March 23, 1953.

[38] Western Germany for the same reason has not been greatly interested in negotiating conventional payments agreements with certain Middle Eastern countries. Cf. Ludwig Erhard, *Deutschlands Rückkehr zum Weltmarkt* (Düsseldorf, 1953), pp. 184–87.

[39] Certain Finnish trade and payments agreements with East European countries contain triangular settlement features.

dustrial and underdeveloped countries, and to structural bilateral deficits that may have resulted from economic, social, and political changes during and after the war, including the pressure to adopt development programs of wide scope.

The first technical problem encountered in the operation of any specific bilateral agreement is that involved in the application of any exchange control system, viz., the prevention of illicit transactions in general and of undesirable capital movements in particular. The over-all efficiency of the exchange control systems in the two partner countries will determine how far these transactions can be prevented. The volume of illicit transactions which went undetected must have been substantial in many instances. They have taken place particularly from soft currency to harder currency inconvertible countries, such as Belgium-Luxembourg and Switzerland, frequently for purposes of further flight to the dollar area. A somewhat similar technical problem arises from speculative leads and lags in the collection and settlement of outstanding claims, which also are known to have affected significantly various bilateral positions.

Further technical problems arise from the need to ensure that the swing margin under a payments agreement is not exceeded in either direction, and that claims below the swing ceiling do not become frozen. Particularly where a swing is low in proportion to the total trade turnover to be financed between the partner countries, it is difficult to prevent extreme bilateral positions, which in turn lead to import cutting, from arising. The first impediment to accurate calculation is in the leads and lags that arise because importers are free to make payment early or late, while exporters, even if they must collect outstanding claims when they fall due, are free to postpone the surrender of the accruing exchange proceeds for two or three months. Second, seasonal deliveries may require a large swing to cover a seasonal extreme bilateral position, and the wide swing margin may then cause incautious licensing policies that result in too large a proportion of the swing being used before the seasonal deliveries for which it was in fact intended are effected. Third, the swing is usually established at a certain proportion of the trade turnover scheduled in a bilateral trade agreement signed with the same partner country. Whenever the trade quotas on either side do not materialize for one reason or another, the swing will be subjected to strain. Obvious examples are a crop failure or the loss of orders for capital goods for which tentative quotas corresponding to a significant proportion of listed quotas had been included in the trade agreement. Fourth, it has frequently proved very difficult to obtain an accurate impression of the amounts at any time "in the pipeline" in either direction, particularly where there has been imperfect coordination between import and exchange control

authorities, or where deliveries of capital goods constitute a significant proportion of one partner's exports to the other. The uncertainties have been enhanced where exporters of capital equipment have been permitted to enter into sales contracts before obtaining an export license.[40] Fifth, a country, after having liberalized a significant proportion of its imports from the EPU area, the dollar area, or both, will find it difficult to increase imports from any specific payments partner. Liberalization, whether of imports or exports, renders the remaining bilateral relations less manageable. Finally, there is a danger that a country in a weak balance of payments position will, as a matter of policy, try to use all the swing credits available to it, in order to alleviate its dollar import payments to the largest extent. This may be done by discriminating in favor of imports from the payments agreement countries while at the same time discriminating against these by export controls or measures with similar effects, such as creation of preferential buying rates for exports settled in convertible currencies.

In addition to the volume and timing of settlements either way, the type of underlying transaction involved may give rise to difficulties, especially in relation to invisibles. The categories of operation in respect of which both countries will permit settlements to be effected through the agreement accounts are usually listed in the agreement. Unless the contrary is explicitly stated, however, these operations remain subject to the exchange control regulations in force in either country during the period of the agreement. Thus the transfer through the agreement may be free while the conclusion of the underlying contracts is severely restricted. For example, if capital amortization or releases of blocked "old" capital are listed in the schedule of permitted transactions, it may well be that one partner does not license such transfers to the other except in hardship cases, or that the other country permits the corresponding inward transfers only exceptionally. Conversely, one partner may wish to add to the approved list certain transactions not listed as permitted. The other country will then have to be consulted in order to obtain permission for transfer through the agreement mechanism. A situation may result where a country does not wish to accept inward transfers in respect of certain specific types of transactions, whereas various partner countries release the corresponding amounts for transfer. Thus Switzerland has prohibited inward transfers through its payments agreement accounts in respect of various capital and transit transactions. These amounts released by the partner countries are usually referred to as "provisional

[40] Some other causes of unexpected payments developments are additions to the list of permitted transactions; changes in transit trade policies; a quick expansion of reciprocal trade which renders inadequate an existing swing credit, the margin often being fixed at 10 per cent or one twelfth of the trade scheduled for the current year.

accounts" and are freely negotiated at discounts for convertible exchange. Where transactions are not on the permitted list, there is always a danger of evasion. For example, in their payments agreements many underdeveloped countries have limited commercial transfers to those in respect of direct trade in order to exclude transit trade except for any transactions specifically discussed and approved on both sides, but evasions continually occur.

Where payments agreements are resorted to in order to promote reciprocal trade, the difficulties in their operation frequently have caused, or contributed to, the stopping or delaying of financial transfers (interest, amortization, profits, pensions), even though initially such transfers may have benefited from the negotiation of an agreement.

Most of the difficulties in managing payments agreements have their cause in trade developments. A basic cause which makes it difficult to influence trade in at least one direction arises when the demand in one country for one of the partner's leading exports is small. For example, large purchases of Brazilian coffee for domestic consumption seem unlikely in the United Kingdom, which is mainly a tea-drinking country. Similar in kind, but different in degree, is the reduction in per capita consumption of coffee in various continental countries which has persisted since the abolition of rationing. Where the demand for certain of the partner country's exports is known to be low, small quotas will normally be included in trade agreements. On the other hand, where a high quota is agreed because demand is expected to be strong, the quota in practice may be used only to a small extent and the resulting shortfall of anticipated exchange earnings may unbalance the agreement accounts. The causes of the nonfulfillment of quotas may lie on either side. The quotas normally—unless state selling or government purchasing is involved—are not binding commitments to export or to import; they merely commit the authorities to the issuance of the necessary licenses to interested parties applying for them. Consequently, listed exports may not become available to the partner country because alternative export outlets have meanwhile been opened up or become more remunerative. Such marketing reversals may arise particularly where the exporting country relies on fluctuating broken cross rates and on varying directional export promotion devices. Similarly, the importing country may show no effective demand for listed goods; for example, because alternative suppliers have meanwhile captured a large share of the market, which may in turn be due to the signing of a payments agreement with a country previously classified in the dollar area and treated accordingly, or to a relaxation of quantitative restrictions on imports from the dollar area. Countries faced with a sudden deterioration of their external position tend to plead hardship in not licensing fully the agreed quotas

for certain imports, particularly those of consumer goods. As a guarantee of specified minimum exports, therefore, trade agreement quotas are far from perfect. Also, excessive export quotas tend to be inserted in some trade agreements under pressure of export interests.

Consequently, shortfalls in the fulfillment of agreed trade quotas are particularly likely under trade agreements with countries resorting to broken cross rates, employing multiple exchange rates that are subject to frequent revision, or changing their criteria for the approval of transit transactions. The same is true in other cases in periods when hard currency goods become soft currency goods, or vice versa. For example, the opportunity to buy Cuban dollar sugar under the terms of a bilateral payments agreement may have direct repercussions on the importing country's purchases from soft currency suppliers, such as Hungary, Brazil, or Peru. There are so many sets of circumstances in which the planned flow of trade deviates widely from the pattern actually materializing that completely satisfactory functioning of payments agreements is rare. Indeed, the experience both with bilateral payments agreements and with the EPU has been that sudden, sharp reversals of bilateral positions may always occur and are hard to prevent. Such reversals may even be cumulative. If, because of an extreme debtor position vis-à-vis Argentina, a European country shifts its wool purchases from Argentina to Uruguay, the bilateral position against Uruguay also will move in a negative direction. And if, because of an extreme creditor position, a European country restricts its exports to Argentina, firms specializing in transactions with South America may then shift their frustrated exports to Brazil, so that the bilateral position with Brazil is likely to show an increased surplus or a reduced deficit. All of these fluctuations are strengthened in bilateral relationships between industrialized and underdeveloped countries by the over-all movements in the terms of trade between wide regions which occur as a result of differences in the behavior of primary commodity prices and prices of manufactured goods.

Another main problem in the operation of bilateral agreements results from the classification of both imports and exports as essentials and nonessentials.[41] The classification may be explicit, as where imports are divided into first, second, and third categories that are allocated exchange at different effective exchange rates. In the major trading countries, however, the distinction is not explicitly and officially made. It varies from time to time, and from country to country, according to

[41] The latter have occasionally been referred to as "traditional exports" or "normal pattern goods." They generally include goods of the type for which "token import schemes" have been operated in some countries. Essentials and nonessentials also have been called "hard" or "strong" and "soft" or "weak" goods, respectively, or "primary" and "secondary" products. In France, essentials are referred to as *produits incompressibles*. Nonessential items are not necessarily either "minor" or overpriced exports.

both commercial policy and general supply and demand criteria. It is therefore difficult to classify any specific commodity. Only the extreme positions are unequivocal. Dollar goods normally admitted from dollar sources and raw materials in short supply which are needed to keep production going are undoubtedly essentials from the viewpoint of the importing country. Many consumer goods, both durable and nondurable, are considered nonessentials because the producing country in its planning finds that a significant proportion can be set aside for export without hurting productivity or creating social unrest, while the importing country is not eager to take these goods because it, again in the view of the authorities, finds that they do not positively (by increasing productivity) or negatively (by preventing social unrest) strengthen the economy, or that they may even hurt it (e.g., by competing with protected infant industries). Countries where goods usually treated as nonessentials have been admitted in large volume because the importing countries considered them useful as a stimulus to increased production have included Belgium-Luxembourg (watches, for example) and Indonesia ("inducement goods"). Even so, the treatment accorded to any specific commodity by the majority of importing countries determines its over-all bargaining value to the exporting countries. Many products of the textile, leather, and furniture industries are generally considered nonessentials; this also is true in many countries of passenger cars, refrigerators, radio and television sets, watches, cutlery, glassware, china, toys, perfumes, wines, and horticultural products. Commodities may come to be considered nonessential temporarily if they move sluggishly because of their high price, which has been true in recent years of some of Brazil's so-called *produtos gravosos*.

In dealing with nonessentials there is often hard bargaining, and the quotas established for them are frequently fulfilled less completely than other quotas, despite the fact that pent-up demand for such goods may well be high, particularly in countries suffering from inflationary pressures. Some countries have consistently failed to grant licenses for more than a negligible proportion of certain agreed nonessential quotas. Nonessential import quotas tend to be balanced with nonessential export quotas. However, they may also be linked to essential goods by bargaining. Countries may not be prepared to sell to their partners certain goods, such as capital equipment, unless the partners also accept specified goods which they value less, such as textiles. The provision of appreciable swing credits or of similar payments facilities has often induced a partner country to acquiesce in larger import quotas for nonessentials than would otherwise have been acceptable. Trade agreements frequently contain commitments binding both parties to "harmonious utilization" of the agreed quotas, i.e., to observance of the proportions between essentials

and nonessentials established in the commodity lists. Similarly, clauses prescribing *pro rata temporis* issuance of import licenses attempt to realize a harmonious division of trade during the period of the agreement, e.g., by prescribing quarterly licensing of 25 per cent of the quotas. Particularly in an environment of bilateralism, a country's bargaining position, and consequently its over-all balance of payments, is greatly affected by the composition of its "export parcel," that is, by the types of commodities available for export.[42]

Trade under many payments agreements is likely to have suffered from lack of facilities for forward cover and from a shortage of short-term financing. The revival of the forward exchange markets in Europe is largely a phenomenon of recent years, and even so the facilities offered are greatest for a few major currencies. Where there were no regular forward facilities, central banks had to buy agreement currencies forward from the exporters selling to the partner countries, or the exporters had to be referred to credit insurance companies. In either case, the resulting transactions were likely to involve a preponderance of relatively weak currencies; the risks involved would tend to rest ultimately on the governments that had to subsidize the credit insurance companies or might expect to see their central banks incur losses on forward transactions. Resort to London and a few other sources in third countries of acceptance credit and other short-term finance has been, for the most part, impossible in trade between payments agreement partners. This, like the difficulties in the field of forward exchange, probably contributed to the high prices observed in such trade.

Over the years, payments agreements and trade agreements have tended to become more flexible in their operation. In fact, the continued increase in their number during recent years has coincided with strong tendencies in some of the major trading countries, particularly in Western Europe, toward an extension of multilateralism. The reopening or expansion of various U.K. commodity markets is evidence of that trend, as is the increased transferability of sterling, the deutsche mark, and certain other European currencies, both within the European currency arbitrage system and by other means. Other evidence is the relaxation of restrictions on dollar imports and a reduced willingness to purchase high-priced commodities from bilateral agreement partners. These

[42] *Economische Voorlichting* (The Hague, August 1, 1952) stated: "The solid foundation of the reciprocal trade relations [between Portugal and the Netherlands] is mainly caused by the fact that Portugal's export parcel consists partly of 'strong' commodities and partly of 'specialties.' Although Portugal's 'strong' products (cork, pyrite, timber, antimony, tungsten, violin resin, sisal) are not outstanding commodities in the world economy, hardly any country can do without them . . . . Besides these strong products, the Portuguese export parcel contains various specialties, which also meet with interest in the Netherlands: manioc root, pineapple, almonds . . . sardines, wine, turpentine oil, cork products, etc."

trends have made the effective administration of bilateral agreements increasingly difficult,[43] particularly because of the nonutilization by major trading nations of part of their bilateral claims and in view of the reduced opportunities for debtor countries to acquire major inconvertible currencies from direct sales to their partner countries. The trend toward multilateralism has been furthered by a reduction in the scope of state importing. It has also been reflected in triangular trade and in sales of agreement balances to third countries.

Methods Used to Influence Bilateral Positions

Since the orthodox methods used to influence the over-all balance of payments position tend to affect both bilateral and plurilateral positions, both may be improved by restrictive monetary, fiscal, and credit policies, by measures to increase productivity, or by devaluation of the currency. Conversely, over-all policies serving to increase domestic consumption and investment may result in a global reduction of excessive bilateral and plurilateral claims. Such global action has been taken particularly in certain OEEC countries. Ad hoc action with regard to specific bilateral or plurilateral positions, on the other hand, has been both more frequent and more widespread. Even domestic measures which are formally of a general nature seem sometimes to have been undertaken (or speeded up) primarily with a view to their impact on the trade and payments relations with specific agreement partners. The abolition of coffee rationing and reductions in taxes and customs duties on coffee and tobacco are instances of such action. Most of the decontrol measures affecting coffee were taken in 1952 or later. While restrictions on dollar coffee from Colombia, Mexico, Venezuela, and Central America were maintained, coffee from EPU sources, such as the Belgian Congo, British and Portuguese East Africa, or Indonesia, had already for some time been imported with a considerable degree of freedom. The decontrol measures, therefore, tended particularly to increase purchases from Brazil. For example, the Danish derationing of coffee on October 15, 1952 followed immediately the liberalization of imports of coffee from Brazil (against payment in Danish kroner only) and from the EPU area.[44] Similarly, measures tending to stimulate the consumption of tobacco seem in certain instances to have raised the level of trade with Greece and Turkey. Nondiscriminatory tariff reductions on commodities for which the partner country is a principal supplier may serve to reduce claims on partner

[43] See P. A. Forthomme, "A propos de l'accord commercial belgo-argentin," *Bulletin Commercial Belge* (Brussels), February 1955.

[44] Conversely, after the negotiation of a payments agreement with Brazil in 1953, which eliminated that country from Finland's dollar area classification, coffee rationing was abolished in Finland.

countries that have incurred an extreme debtor position on bilateral account. Western Germany in its trade agreement of November 4, 1954 with Iran undertook to lower the import duty on certain rugs.

Ad hoc methods to influence specific bilateral positions can be classified in four groups: quantitative measures, price measures, credit measures, and transferability measures. Many of the techniques involved may also be used to affect countries' positions in EPU, and the techniques in the different groups have often been used in combination with each other.

Quantitative measures

Quantitative measures are those intended to affect, through the manipulation of quantitative trade or exchange restrictions, the volume of payments to be recorded in one or both directions in the agreement accounts. They include the adaptation of imports and exports both within and outside the quotas established in any bilateral trade agreement accompanying a payments agreement; this may require the revision of exchange budgets. Usually the expansion of reciprocal trade by increased exports from the debtor to the creditor country is difficult or impracticable even if an open general license is granted for the debtor's main export products, as is done in Western Germany through certain types of *offene Ausschreibungen*,[45] or if the creditor applies its OEEC liberalization list to the partner country. Consequently, quantitative correction measures tend to result in a contraction of trade because of the downward adjustment of the debtor's purchases, and of the creditor's sales, often in response to action undertaken simultaneously in the two partner countries. Country A has an incentive to restrict exports (particularly of essentials) to country B which is in an excessive bilateral debtor position, while simultaneously B will be inclined to restrict imports (particularly of nonessentials) from A. Thus, European countries have at various times substantially reduced the granting of licenses for exports to Argentina without raising their purchases significantly. But since unilateral measures are apt to lead to retaliatory action, they tend to be put off as long as possible. Also, in order to correct its creditor position, A may unilaterally increase the exchange allocations for purposes not referred to in the trade agreement, or for types of outward

[45] *Offene Ausschreibungen* are invitations to submit applications for import permits for specific goods, usually without limit as to either time or quantity, but with certain restrictions as to country of origin and currency of settlement. An unpublished limit is, however, applied administratively to some *offene Ausschreibungen*, or a published limit as to time and/or quantity is indicated. The invitations are published in the *Bundesanzeiger* (Official Gazette). Few countries publish the detailed regulations applicable to imports from trade and payments agreement partners.

transfer not envisaged in the payments agreement, such as extra-quota imports of listed goods, tourist travel, outward capital movements, etc.[46] Conversely, B may permit A to undertake additional transit transactions of a type already approved; for example, A may be permitted to purchase products originating in B for resale without price or exchange adjustment to country C to which B had previously sold the same products directly. A reduction of traditional transit sales by A to B will work in the same direction. Quantitative corrective measures may include purchases by A of some of B's products in excess of, or in anticipation of, requirements. For example, Western Germany in 1953 considered the purchase of Argentine grain on condition that Argentina should store the grain until it was required in Germany. Also, the authorities in the creditor country may use part of the accumulated soft currency by awarding contracts for public works to firms established in the debtor country. This, however, has been rare, since the countries that have held large bilateral debtor positions over long periods have, on the whole, been underdeveloped countries. In certain cases it is agreed, as a corrective measure, that a specific ratio shall be observed between the countries' sales to each other. A simple type of linking that has been used in Western Europe to prevent further claims arising on East European countries is to prescribe that exports shall be compensated with equivalent imports. Some element of price or exchange rate adjustment is seldom absent from compensation deals, however. Quantitative measures have frequently involved sudden shifts from one source of supply to another; for example, from dollar to soft currency sources or from one payments agreement partner to another. In all cases, it is easiest to take these corrective measures where there is extensive state trading and where highly restrictive trade and exchange licensing policies are applied. The marked reduction in the role of state importing and exporting since the end of the boom caused by the Korean conflict has contributed to a shift of emphasis to other corrective measures, particularly those involving prices or exchange rates.

Price measures

Corrective pricing measures may affect the commodities traded, the exchange rates, or both. The simplest type is a nondiscriminatory price

[46] Frozen swing claims represent capital exports in the sense that the creditor country has made real resources available to the partner country without obtaining adequate compensation in goods and services. The creditor country can obtain such compensation by permitting its residents to make investments in the debtor country in subsidiary manufacturing plants, sales organizations, etc. Such investments amount to a transfer of real resources from the debtor to the creditor country equivalent to the reduction in the latter's swing claim.

correction applied to a generally overpriced export commodity. Dual and multiple pricing practices may lead to an export price different from that paid by domestic consumers, or to different export prices for different importing countries. For example, the Argentine Trade Promotion Institute (IAPI), the state trading monopoly, usually quotes different prices for the same export commodity depending on the relative scarcity of the currencies offered in settlement, the lowest prices usually being reserved for sales in U.S. dollars and, in the last two or three years, in sterling. It has also quoted buying rates for various currencies that were not in line with their official parities. When France applied the more favorable type of "EFAC treatment" (i.e., the retention in special accounts of export proceeds, for use only in specified transactions) to exports to Mexico and Peru, against both of which France ran continuous bilateral deficits under payments agreements, that action tended to cheapen French exports to those countries and thus alleviate the French debtor position. Sometimes bilateral creditor countries have forced exporters to excessive debtor countries to pay a levy which was then transferred to importers buying overpriced commodities in the debtor country. Price corrective measures may also take the form of discriminatory tax remission on exports.

The exchange rate may be used as a corrective device; for example, in a number of Egyptian payments agreements which provide for a fluctuating rate. Where a payments agreement provides for a fixed exchange rate, the effective exchange rate may nevertheless be made into a fluctuating one; for example, by the use of export retention quotas. Thus, there is a fixed rate under the payments agreement between Egypt and Western Germany, but Egyptian exporters to Germany are granted so-called import entitlements, i.e., rights to import German merchandise, imports of which are otherwise severely restricted or prohibited. The import rights are negotiable, and importers are prepared to pay exporters an amount for them that varies with the general supply and demand situation in Egypt and with the flow and composition of imports from Germany. Similar price-corrective measures have been applied through the exchange rate system under several payments agreements between European and Latin American countries when European central banks ceased buying the full proceeds from exports to specific partner countries. The cross rate may also be broken in the debtor country. Chile in 1953 and 1954 permitted both sterling and the West German agreement dollar to rise to significant premia in the Chilean banking free market, compared with the U.S. dollar, while there were large discounts on certain other agreement dollars. Brazil, under the auction system introduced in 1953, allowed separate selling rates to arise according to the currency and the import category involved. In Brazil, too, the broken cross rates in certain cases (including sterling and the West German agreement dollar)

have at times involved quotations for payments agreement currencies in excess of those for the U.S. dollar for the same import category. Argentina, in addition to its multiple pricing policy and its regular multiple rate structure, has created special subsidy export rates for wool and hides provided they are either part of an intergovernmental compensation deal or are settled in U.S. dollars or specified agreement currencies. Earnings in one currency theoretically may be stimulated by granting to those who surrender the currency privileges in the use of a different currency. This principle has been applied in Denmark, where a retention quota on exports to the dollar area may be used to purchase a scarce, nonliberalized commodity (automobiles) from EPU countries. Similar is the Japanese "linking system" under which unprofitable exports were linked with highly remunerative imports of heavily restricted goods, particularly dollar commodities, such as sugar and canned pineapple. Japan has also operated a system of linking imports from hard currency and soft currency sources. Imports of raw cotton from the United States, for example, were permitted only if a certain quantity of cotton was also bought outside the dollar area. Exports to the dollar area may be hampered if the effective buying rates are more favorable for important agreement currencies than for the U.S. dollar. In Western Germany that situation cannot arise, since in April 1954 the quotations of the U.S. dollar and of substantially all agreement dollars were unified (the measure did not affect the Brazilian accounting dollar). Broken cross rates may be applied simultaneously by both parties to a payments agreement, e.g., in Argentine and Brazilian trade with several European countries. Another type of price measure (used mainly to keep trade in certain specific commodities moving rather than to correct a bilateral position) is the authorization of barter or compensation transactions in which part of the windfall profits on a severely restricted import commodity serves to offset a loss on an overpriced export commodity. Where the import commodity is one not normally allowed to enter from the partner country, there is in effect a combination of price and quantitative measures. The United Kingdom in principle does not permit compensation transactions, but in 1950–51 they occurred on a large scale between Brazil and the United Kingdom, when a considerable proportion of Brazilian sales of minor exports to Europe was effected on that basis.[47]

Credit measures

Where bilateral positions have impaired trade between partner countries, the agreed swing margins have frequently been adjusted in one way or another. The creditor country might refrain from requiring settlement

[47] On the subject of cross rates under bilateralism, see C. Bresciani Turroni, "The Problem of the Cross Rates of Exchange," *Review of Economic Conditions in Italy* (Banco di Roma, Rome), May 1948.

in respect of the excess overdraft to which it was entitled, or might formally agree to an increased swing. Hard currency cover for excess overdrafts might be pledged by the debtor and later returned by the creditor, the cover serving only as a guarantee against a further increased debtor position. One way to alleviate a bilateral creditor situation where the payments regime is centralized is to decentralize it by permitting commercial banks to carry agreement balances. Where letters of credit outstanding have been charged against the swing, a further corrective measure is to ignore these amounts in calculating the extent to which the swing credit has been exhausted. Both measures apparently were resorted to by Western Germany and Japan when they renegotiated their bilateral payments agreement in 1954, when Japan was an extreme debtor. A fairly general trend toward increased swing margins was checked and reversed in 1952 when many excessive bilateral positions had become frozen. Thus Western Germany in 1953 reduced the swings in the payments agreements with certain bilateral debtor countries (Finland, Hungary, and Spain), making the swings variable in two cases.

Apart from swing credits, European countries have sometimes made lines of credit available to underdeveloped countries for the specific purpose of facilitating sales of capital equipment on deferred payments. Also, the export credit facilities provided by official and semiofficial institutions have usually been drawn upon heavily by exporters to bilateral account countries with weak balance of payments positions, and the availability of such credit has occasionally been the subject of intergovernmental negotiations. Credit measures further include changes in export credit insurance coverage and premiums vis-à-vis payments agreement partners. Where exchange control regulations set limits on the terms of payment that exporters may offer to their foreign buyers, these regulations may be adapted in such a way as to encourage sales to payments agreement partners who are not in danger of running an excessive debtor position, and to discourage sales to partners against whom significant claims already exist. Prescribing the opening of a letter of credit for sales to a country where similar products are offered on a collection basis by other countries, for example, will tend to frustrate some potential sales to that country. Other discriminatory techniques in the credit field are differentiation between the conditions on which export bills drawn in different currencies may be discounted, and between the amounts to which importers may effect advance payment or the sums in domestic currency which must be deposited when ordering goods abroad.

Transferability measures

Apart from access to specific inconvertible currencies via the International Monetary Fund or the International Bank for Reconstruction

and Development, transferability of balances under payments agreements is obtained mainly in four ways. The simplest and most important method is that where an inconvertible country, under the terms of its payments agreement with another inconvertible country, is permitted to use its claims on the latter for financing current trade with third countries. Thus, even before the changes of March 22, 1954 in the U.K. exchange control system, sterling could be used for transfers among substantially all inconvertible countries outside the sterling area. For example, if it was agreeable to both the Bank of England and the Netherlands Bank, Peru could make settlement for imports from the Netherlands in sterling that might have been earned either from direct Peruvian sales to a sterling area country or from, say, sales to Chile or France. Another case of transferability is that involved in cheap currency deals, in which inconvertible claims are sold to nonresidents in free exchange markets at home or abroad. Whereas this type of measure frequently has been at variance with the wishes of the partner country whose currency was sold at a discount, ad hoc transfers of existing payments agreement balances—unrelated to any specific underlying transactions—have occurred with the approval of all countries concerned. Such transfers appear to have been effected mainly between OEEC countries. Approval of transit transactions of a kind not previously authorized may also serve to render an agreement currency transferable. Brazil has permitted Western Germany to purchase certain Brazilian products for resale to specified destinations with financing under the German-Brazilian payments agreement. In undertaking such triangular transactions, Germany in effect was enabled to finance imports from third countries with part of its bilateral claim on Brazil. Without necessarily entering into commercial switch transactions, some countries, such as Japan and Yugoslavia, during the last two or three years have made some use of dollar commodities to reduce overdrafts under bilateral payments agreements. Since dollar goods usually bring a premium in inconvertible countries if sold in inconvertible currency, such transactions would allow the debtor country to save a little on the amounts to be settled. The creditor countries would again be enabled to finance imports from third countries with part of their bilateral claims.

The only simple way to revive paralyzed trade with a country against which an excessive bilateral payments agreement claim has been accumulated is to consolidate all or part of the claim and thus wipe the slate clean, that is, clear the accounts. Once a backlog develops, the debtor country tends to grant exchange first for settlement of outstanding claims in respect of essential imports, while disregarding the chronological order of outstanding claims, or even for financing further current imports of essentials, particularly oil. The liquidation of bilateral arrears in one

way or another is at the expense of the creditor country's exports to the partner country. Consolidation of bilateral claims, nevertheless, is a measure that creditors tend to avoid as long as possible, although there has been such consolidation a number of times, particularly between industrial European and underdeveloped non-European countries. It has been effected less explicitly where bilateral trade agreements between such pairs of countries have included significant quotas for deliveries of capital goods on deferred payment terms by the European partner.

Impact of EPU on Bilateralism

With the establishment of the EPU, the payments agreements between pairs of participating countries were left with nothing but a technical function. Since all member currencies became transferable among EPU members, they all became equally hard (or equally soft) to any one of them. Consequently, an EPU member no longer had hardness of currency as a reason for discriminating among other members. This enabled a nondiscriminatory approach to be adopted in licensing imports and invisibles. At the same time, the settlements to be made by debtor countries were sufficiently soft because of the working of the quotas to enable liberalization of trade and invisibles. The liberalization measures greatly facilitated exports of goods and services from previously hard currency countries, such as Belgium-Luxembourg, Switzerland, and Western Germany, to other members of the group. In respect of commodities and services (particularly tourism) involved in intra-EPU trade, trade in nonessentials was facilitated disproportionately with the progressive relaxation of restrictions, since essentials usually were the first to be liberalized. The equivalence of all EPU currencies from the balance of payments point of view permitted a substantial simplification of exchange control policies and techniques, and resulted in a significant reduction of the degree of bilateralism practiced among OEEC countries. Members were faced with only two wide currency areas, the dollar area and the EPU area, including overseas territories, plus a number of "third countries" outside both areas, with most of which bilateral payments agreements were in force. The last group included Eastern Europe. This in turn made it possible to permit the importation of liberalized goods originating in any OEEC country (or nonmetropolitan territory) via any other OEEC country. Also, import licensing could be changed from advance reviewing of applications to retroactive checking of declarations (notifications) of imports effected. Presumably because of the need for strategic export and transshipment controls, the declaration method seems to have remained of minor significance in the export field.

Trade agreements, constituting the main instrument for the imple-

mentation of discrimination within the group, continued to be negotiated among the participants in the EPU but, in view of the high degree of liberalization of imports and invisibles, the quota lists could be shortened considerably, and in some agreements they have now been omitted. Commodities for which quotas are still included in most trade agreements between OEEC countries are agricultural and horticultural products, various textiles, passenger cars, trucks, radio and television sets, and other appliances. Bilateral liberalization, on the other hand, has occasionally led to the opening of quotas for goods not previously traded between two countries.[48] Bilateral bargaining about the over-all composition of reciprocal trade has also continued. For example, it was reported[49] that the revised Austrian-Netherlands trade agreement of early 1952 included a provision requiring that an attempt be made to establish a more symmetrical trade structure, meaning that the percentage of semifinished goods exported by the Netherlands should rise and that of industrial products should decline. Nevertheless, the simplification of discrimination between OEEC countries has now proceeded to the point where the results of some negotiations are merely laid down in agreed minutes and where the negotiations occasionally are conducted by mail. The application by most EPU countries of so-called OEEC free lists (or soft currency open general licenses) to all other participants was equivalent to the existence of a plurilateral trade agreement with unlimited import quotas for most of each country's import commodities.[50] In addition, the OEEC

[48] See the following statement in the *Board of Trade Journal* (London), June 6, 1953, p. 1145: "The Board of Trade announce that arrangements have been made with the Federal Republic of Western Germany for a quota for 1953 of DM 32 million (£2.7 million) for the import into Western Germany of passenger cars from the United Kingdom. Her Majesty's Government at the same time have agreed to open a quota of £2 million for the import of German cars into the United Kingdom. Suitable quotas for spares are also being established. Her Majesty's Government have hitherto been unable to agree to ordinary commercial imports of passenger cars from the Continent at a time when the United Kingdom industry was committed to exporting the larger part of its production. Though the need for exports remains as urgent as ever, it has for some time been felt both by the industry and by the Government that the time had come to reopen trade in passenger cars with the European producing countries as part of the effort to increase intra-European trade and strengthen the economies of the countries of Western Europe. The arrangements now made with Western Germany are a substantial step in that direction. Discussions are proceeding with the French authorities for similar reciprocal arrangements although, at the wish of the French, on a considerably smaller scale."

[49] *De Maasbode* (Rotterdam), March 25, 1952.

[50] The establishment of the EPU did not, however, at the time increase liberalization by all countries. Western Germany in 1949 had bilateral trade agreements with Austria, the Netherlands, Sweden, and a few other countries, under which imports into Germany had been almost completely liberalized. This discriminatory treatment was terminated in 1950 by the application of a 60 per cent free list to all OEEC members. Nor is it certain that formal liberalization always corresponds to *de facto* freeing of imports. Thus, the *Economist* (London, January 10, 1953,

free lists in several cases were applied also to European non-OEEC countries, such as Spain or Finland, and to overseas countries, such as Indonesia and certain outer sterling area territories. In part, this was a result of the need to maintain imports from bilateral debtors with high costs and prices in the face of the easy imports from EPU countries. EPU countries applying their OEEC free lists to outside countries, however, thereby relinquished much of their bargaining power vis-à-vis the beneficiaries. This by itself represented a move away from strict bilateralism, even in trade with non-EPU countries.

Another consequence of the reduced significance of bilateral positions in EPU was the increased use of global quotas for imports of a specific commodity from all member countries. The use of these quotas has put certain export prices under pressure, but the practice has drawn much criticism, since it tends to cause a rush to exhaust the quota, which disturbs existing trade channels, causes price cutting, and may have other adverse effects, particularly on seasonal exports (the timing of a global quota may prevent a traditional supplier from effecting deliveries) and on exports of perishable goods.

The exact level of the holdings of specific currencies under bilateral payments agreements with other EPU countries has become largely immaterial, although naturally countries still tend to use bilateral deficits as a bargaining device to obtain import concessions from their creditors. The nature of the bilateral accounting positions, moreover, was changed greatly in 1953 by the resumption of multilateral exchange arbitrage, spot and forward, among nine EPU countries. The bilateral positions between countries participating in the arbitrage no longer reflect their bilateral balance of payments positions. The Annual Report for 1953 of the Swiss Compensation Office indicates that the bilateral position vis-à-vis the United Kingdom, as compensated by the EPU mechanism, in 1953 amounted to a Swiss credit of Sw F 213,700,000, which resulted from a credit of Sw F 302,968,000 before arbitrage and a debit of Sw F 89,268,000 owing to arbitrage; the corresponding figures for the position vis-à-vis Western Germany were a Swiss debit of Sw F 71,071,000 resulting from a debit of Sw F 187,318,000 before arbitrage and a credit of Sw F 116,247,000 on account of arbitrage.

Bilateral trade agreements among EPU countries have increasingly

p. 109), in a discussion of Belgian sales of bricks to the United Kingdom, observed: "Although cement is also among the items on open general license [from OEEC countries], since the spring there has been a gentlemen's agreement between the Government and the cement industry to suspend imports of Dutch and Belgian cement because they were adding to the drain on the gold reserves. The trade in bricks has not yet reached such dimensions, but no doubt the authorities will be watching it." The free entry of liberalized goods may also be hampered by the level of customs duties, purchase tax, etc.

reflected the results of bargaining for basic commercial policy objectives, mainly agricultural and industrial protectionism, rather than for bilateral ad hoc objectives. The more progress is made toward liberalization,[51] the greater becomes the significance of import tariffs, sales taxes, etc. Progressive liberalization also seems to have led in some circumstances to greater reliance on export incentives of various kinds, in order generally to offset increasing import expenditures by rising export receipts or to facilitate specific exports to OEEC countries admitting these exports on a nondiscriminatory basis. In contrast to this return to basic commercial policy where hardness-of-currency discrimination no longer is involved, a trend toward bilateralism for hardness-of-currency reasons has also gained some ground recently, particularly in trade with Turkey. There the trend has manifested itself in bilateral arrangements regarding the liquidation of Turkish commercial backlogs, in prescription of currencies designed to prevent imports of Turkish goods on a transit basis, and in price equalization schemes designed to cheapen imports from Turkey and to render exports to that country less remunerative. Earlier, a difficult payments position in Greece resulted in a number of bilateral credit arrangements with that country.[52]

The renegotiation of payments agreements among EPU countries, although mainly of a technical character, has occasionally involved fairly significant changes affecting the functioning of European exchange markets and the use of specific soft currencies. Thus the Anglo-German "monetary agreement"[53] of June 1, 1953 permitted settlements and invoicing in deutsche marks or sterling, at the option of the parties to a transaction, in trade with the sterling area, all of which previously had been financed in sterling in accordance with the "sterling payments agreement" of 1950. The United Kingdom declared the deutsche mark a "specified currency," so that traders had to surrender receipts in that

[51] The scope for maneuvering to influence bilateral positions in the EPU has been reduced even further since the abolition of quantitative restrictions on coal, iron, iron ore, steel, and scrap among the members of the European Community for Coal and Steel (Belgium, France, Western Germany, Italy, Luxembourg, and the Netherlands). The members of the Community must submit certain export commitments for these commodities to the High Authority for approval.

[52] For a study of the trade and payments relations between two OEEC countries, both prior to and after the creation of the EPU, see J. Wemelsfelder, *De Duits-Nederlandse economische betrekkingen na 1945* (Leyden, 1954). Also see Carl Zimmerer, "Die Liberalisierung des Deutsch-Schweizerischen Wirtschaftsverkehrs," in *Zwischenbilanz der Liberalisierung* (Frankfurt am Main, 1954), Chapter V. A description of relations between an OEEC and a non-OEEC country is given in Merlyn Nelson Trued and Raymond F. Mikesell, *Postwar Bilateral Payments Agreements* (Princeton Studies in International Finance, No. 4, Princeton, N.J., 1955), pp. 66–80.

[53] The U.K. monetary agreements provide for the use of both sterling and the partner country's currency, while sterling payments agreements provide for the use of sterling only.

currency to an authorized dealer, and trading in it was officially permitted. The official exchange rate was established at DM 11.76 per pound. Formerly, Article 2 of the 1950 agreement had determined the exchange rate as follows: "The Bank deutscher Länder shall buy and sell sterling, and the relation between the Bank deutscher Länder's rate for sterling and its rate for United States dollars shall be the middle rate quoted by the Bank of England for the United States dollar." The Austro-German payments agreement of May 13, 1954 permits the decentralization of payments between the two countries, envisaging that German commercial banks shall conduct their accounts in deutsche marks and that Austrian banks shall conduct theirs in schillings. The renegotiation of certain other Austrian payments agreements with OEEC countries (e.g., France and the Netherlands) has similarly permitted decentralization and the use of two currencies. Technical revisions of other payments agreements have included shortening of the period required for giving notice of termination, and revision of exchange rate clauses in order to widen the spreads between buying and selling rates in accordance with the needs arising from the revival of the European foreign exchange markets.

The EPU has not entirely done away with bilateralism vis-à-vis the nonmetropolitan areas of member countries. Several EPU members have negotiated bilateral trade agreements with various independent sterling area countries, with Indonesia, or with the Belgian, French, and Portuguese overseas and associated territories (frequently through separate quota lists in the trade agreements with the metropolitan country). This is because the nonmetropolitan areas are not required to liberalize their imports from OEEC countries, and vice versa.

The operation of the EPU has also affected the participating countries' trade and payments relations with third countries. The high degree of OEEC liberalization is one of the main impediments to the manipulation of bilateral positions vis-à-vis non-OEEC soft currency countries through the use by OEEC countries of quantitative import restrictions. The same is true of the widening scope of commodity markets and other forms of transit trade, and of the return of imports of various cereals, oils, fats, and other primary commodities to private trade. It has not been possible to offset these effects by the application of OEEC free lists and open general licenses for specific commodities to "third countries." This, in turn, has increased the reliance on manipulation of quantitative restrictions on the export side, and on price or exchange rate devices. Since the non-OEEC soft currency countries have tended to be heavy debtors on bilateral account during the last two years, the alternative in many cases has been either to reduce exports or to sell them on credit. Largely as a result of these factors, there has been a tendency for some EPU members

to cease considering their trade and payments relations with their non-OEEC agreement partners on a strictly bilateral basis, even if in so doing the continuation or restoration of high levels of exports to some of the latter has been endangered. On the other hand, quantitative import restrictions on certain goods have been maintained largely for the purpose of influencing specific bilateral relationships with non-OEEC agreement partners. In several EPU countries, quantitative restrictions on citrus fruits, for example, do not serve either balance of payments or protective purposes but facilitate the application of bilateralism in the trade and payments relations with such countries as Spain and Israel.

Trade with the dollar area has been affected on the European import side mainly as a result, directly and indirectly, of the reshaping of dollar import programs (for both direct and transit imports) under the influence of OEEC countries' dollar settlements with the EPU. Some EPU countries have tended to consider dollar receipts from the EPU as reversible and therefore "mortgaged." But when a few EPU countries relaxed their restrictions on imports of specific dollar goods, the dollar import regimes for those goods in certain other OEEC countries could not diverge greatly without either causing clandestine transshipments (e.g., of coffee) to the countries with the stricter import regimes or making their export industries uncompetitive (as, for example, the export of raw cotton). There also has been a tendency for extreme debtors in EPU to relax their restrictions on dollar imports in view of the fact that goods payable in EPU currencies ultimately cost dollars and have often been somewhat more expensive. The cumulative accounting principle in EPU, together with the requirement of progressive gold and dollar settlements by debtor countries, has caused a complete reversal of many countries' evaluation of the relative strength of the dollar, the EPU currencies, and third currencies. Consequently, transit trade policy has also been reversed from time to time, as when the United Kingdom in the second half of 1952 sold for EPU currencies commodities of dollar area origin valued at about $170 million. The reopening and expansion of various London commodity markets may perhaps be regarded as having been hastened by the developments in the U.K. net accounting position in the EPU.

On the whole, therefore, the EPU, although in principle based on regional discrimination against the dollar area, does not seem to have prevented certain developments tending to reduce individual discrimination against dollar imports. This, in turn, seems to have reduced the anxiety of EPU countries to establish some degree of balance at a high level in trade and payments with their non-OEEC agreement partners.

Several significant further moves toward multilateralism were made by OEEC countries early in 1954. On March 22, nonresident current

sterling held by non-dollar countries was "unified" by the transformation of most "bilateral accounts" and other inconvertible accounts into "transferable accounts"; and on April 1, 1954, Western Germany permitted German import payments to be credited to two new types of nonresident deutsche mark account, viz., "convertible" marks and deutsche marks "with limited convertibility."[54] In both cases, the principle at work was the multilateralization of bilateral relationships, permitting payments agreement partner A to spend current earnings from sales to the sterling area (or to Western Germany) on purchases from payments agreement partner B;[55] the barrier between the dollar area and the non-dollar area was retained, while that between EPU and bilateral payments agreement partners was removed; but a small number of the bilateral payments agreement partners were provisionally excluded from the multilateralization moves.

Some time had necessarily to elapse before these measures could produce their full effect. These effects depended largely on the action taken by other countries with inconvertible currencies. Switzerland notified its traders that imports from Western Germany must continue to be settled through the agreement accounts, and that certain export proceeds might be received in the form of credits to deutsche mark accounts with "limited convertibility." Finland, on the other hand, consented to the termination of the bilateral payments agreement under which trade with Germany was financed in agreement dollars, and switched over to financing in deutsche marks with "limited convertibility." Developments at the time this paper was written were already justifying the expectation that both the U.K. and the German moves were likely to facilitate transit trade financed in inconvertible exchange. The new deutsche mark accounts were already being used for that purpose.[56] It was also likely that transit trade in sterling would be facilitated particularly by the fact that the privilege of transferability for sterling which had previously been limited to transfers in respect of direct current transactions had, by the changes described above, been established regardless of the type of underlying transaction. The conclusion seemed justified that these measures taken by the United Kingdom and Germany were tending to

[54] The latter are sometimes referred to as *Beko* marks or transferable marks.

[55] See Artur Feest, "Die handelspolitische Rolle des Notenbankkredits," *Zeitschrift für das gesamte Kreditwesen* (Frankfurt am Main), December 1, 1954, pp. 764–66.

[56] "The demand for deutsche mark balances with 'limited convertibility,' which have assumed great importance particularly in the implementation of transit trade transactions, has continually been brisk [May 1954]. Besides the European transit firms, American banks and traders are increasingly appearing as buyers, so that the supply at times is insufficient to meet the demand. As regards its exchange rate, the deutsche mark with 'limited convertibility' has completely adjusted itself to the price of deutsche marks on 'accounts C provisoire.'" (*Devisen-Bulletin*, Handelsbank in Zürich, Zürich, June 1954, p. 146.)

unify the entire non-dollar world by substantially reducing, for the benefit of those countries prepared to make full use of the new facilities, the distinction—from the standpoint of balance of payments—between EPU and bilateral payments agreement partners, as well as the distinction between the various bilateral partners.

Appendix

The following tables, based on both unofficial and official sources, summarize the methods used, as of May 1, 1955, for financing international trade. The United States and Canada, neither of which is a party to any payments agreement, have been omitted from the tables. Table 2 is an up-to-date and expanded version of Table 1 in Johan H. C. de Looper, "Recent Latin American Experience with Bilateral Trade and Payments Agreements," *Staff Papers*, Vol. IV, No. 1, p. 104. An earlier version of these tables was made available to the U.S. Department of State for reproduction in its Intelligence Report, IR-6110R2, *Bilateral Agreements in International Trade*, March 4, 1955.

The symbols used in the tables are as follows:

X A bilateral payments agreement, compensation agreement, clearing arrangement, or similar arrangement is in force.

0 There is no bilateral payments agreement or similar arrangement, but intertrade may, though it need not, be financed in transferable sterling.

st One of the two countries is a member of the sterling area and intertrade is financed in transferable sterling or, in some cases, in the non-sterling area country's currency. For Turkey, see footnotes to Tables 1, 2, and 3.

sa Both countries belong to the sterling area and finance their intertrade in resident sterling.

e A bilateral payments agreement or similar arrangement exists, but bilateral positions are multilaterally offset through the EPU accounting mechanism.

— No soft currency financing; exclusive use of U.S. dollars, other convertible currencies, or convertible soft currency accounts (such as American Account sterling).

TABLE 1. FINANCING OF TRADE AMONG EUROPEAN COUNTRIES

TABLE 1. FINANCING OF TRADE AMONG EUROPEAN COUNTRIES

	Members of European Payments Union																			Other Western Europe		Eastern Europe								
	Austria	BLEU	Denmark	Eire	France	Western Germany	Greece	Iceland	Italy	Nether-lands	Norway	Portugal	Sweden	Switzerland	Turkey[1]	United Kingdom	Finland	Spain	Yugoslavia	Bulgaria	Czecho-slovakia	Eastern Germany	Hungary	Poland	Rumania	U.S.S.R.
EPU		e	e	st	e	e	e	e	e	e	e	e	e	e	e	st											
Austria			e	st	e	e	e	e	e	e	e	e	e	e	e	st											
BLEU	e		e	st	e	e	e	st	e	e	e	e	e	e	e	st											
Denmark	e	e		st	e	e	e	e	e	e	e	e	e	e	e	st											
Eire	st	st	st		st	st	st	sa	st	st	st	st	st	st	st	sa											
France	e	e	e	st		e	e	st	e	e	e	e	e	e	e	st											
Western Germany	e	e	e	st	e		e	st	e	e	e	e	e	e	e	st											
Greece	e	e	e	st	e	e		st	e	e	e	e	e	e	e	st											
Iceland	e	st	e	sa	e	st	st		st	st	st	st	st	st	st	sa											
Italy	e	e	e	st	e	e	st	st		e	e	e	e	e	e	st											
Netherlands	e	e	e	st	e	e	e	st	e		e	e	e	e	e	st											
Norway	e	e	e	st	e	e	e	st	e	e		e	e	e	e	st											
Portugal	e	e	e	st	e	e	e	st	e	e	e		e	e	e	st											
Sweden	e	e	e	st	e	e	e	st	e	e	e	e		e	e	st											
Switzerland	e	e	e	st	e	e	e	st	e	e	e	e	e		e	st											
Turkey[1]	e	e	e	st	e	e	e	st	e	e	e	e	e	e		st											
United Kingdom	st	st	st	sa	st	st	st	sa	st	st	st	st	st	st	st												
Other Western Europe																											
Finland	0			st		0										st											
Spain	0			st		0										st											
Yugoslavia	X			st		X										st											
Eastern Europe																											
Bulgaria				st												st											
Czechoslovakia				st												st											
Eastern Germany				st												st											
Hungary				st												st											
Poland				st												st											
Rumania				st												st											
U.S.S.R.				st												st											

[1] Turkish-held sterling is not automatically transferable.

TABLE 2. FINANCING OF TRADE BETWEEN WESTERN AND EASTERN HEMISPHERE COUNTRIES

	Members of European Payments Union																		Other Western Europe			Eastern Europe							Other	
	Austria	BLEU	Denmark	Eire	France	Western Germany	Greece	Iceland	Italy	Nether-lands	Norway	Portugal	Sweden	Switzerland	Turkey[1]	United Kingdom	Finland	Spain	Yugoslavia	Bulgaria	Czechoslo-vakia	Eastern Germany	Hungary	Poland	Rumania	U.S.S.R.	Israel	Japan
South America																												
Argentina	×	×	×	st	×	×	0	st	×	×	×	0	×	×	0	st	×	×	×	×	×	×	×	×	×	×	0	×
Bolivia	—	×	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—
Brazil	×	0	×	st	×	×	×	×	×	×	×	×	×	0	×	st	×	×	×	0	×	0	×	×	0	0	0	×
Chile	0	×	×	st	×	×	0	st	×	×	0	×	×	0	0	st	0	×	×	0	0	0	0	0	0	0	0	0
Colombia	—	×	×	—	—	—	—	—	×	—	—	—	—	—	—	—	×	×	—	—	—	×	—	—	—	—	—	—
Ecuador	—	—	—	—	×	×	—	—	×	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—
Paraguay	×	0	×	st	×	×	0	st	×	×	0	0	0	0	0	st	×	×	×	0	×	0	×	0	0	0	0	0
Peru	0	0	0	st	×	0	0	st	0	0	0	0	0	0	0	st	0	0	0	0	0	0	0	0	0	0	0	—
Uruguay	×	×	0	st	×	×	×	st	×	×	0	0	×	×	×	st	×	×	×	0	×	×	×	×	0	×	×	—
Venezuela	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Other Latin America																												
Costa Rica	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cuba	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—
Dominican Republic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
El Salvador	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—
Guatemala	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Haiti	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Honduras	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mexico	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—	×	—	—	—	—	—	—	—
Nicaragua	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Panama	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

[1] Turkish-held sterling is not automatically transferable.

TABLE 3. FINANCING OF TRADE AMONG EUROPEAN COUNTRIES AND COUNTRIES IN THE MIDDLE EAST,

[1] Turkish-held sterling is not automatically transferable.

TABLE 3. FINANCING OF TRADE AMONG EUROPEAN COUNTRIES AND COUNTRIES IN THE MIDDLE EAST, ASIA, AND THE PACIFIC

	Members of European Payments Union																Other Western Europe			Eastern Europe						
	Austria	BLEU	Denmark	Eire	France	Western Germany	Greece	Iceland	Italy	Netherlands	Norway	Portugal	Sweden	Switzerland	Turkey[1]	United Kingdom	Finland	Spain	Yugoslavia	Bulgaria	Czechoslovakia	Eastern Germany	Hungary	Poland	Rumania	U.S.S.R.
Middle East																										
Egypt	×	×	0	st	×	×	×	st	×	×	0	×	0	×	×	st	0	×	×	×	×	×	×	×	×	×
Ethiopia	0	0	0	st	0	0	0	st	0	0	0	0	0	0	0	st	0	0	0	0	0	0	0	0	0	0
Iran	0	0	0	st	×	×	0	st	×	×	0	0	0	×	×	st	0	0	0	0	×	0	×	×	0	0
Iraq	st	st	st	sa	st	st	st	sa	st	st	st	st	st	st	st	sa	st	st	st	st	st	st	st	st	st	st
Israel	0	0	×	st	×	0	×	×	×	×	×	0	0	×	×	st	×	0	×	×	0	0	×	×	×	0
Jordan	st	st	st	sa	st	st	st	sa	st	st	st	st	st	st	st	sa	st	st	st	st	st	st	st	st	st	st
Lebanon	0	0	0	st	×	0	0	st	0	0	0	0	0	0	0	st	0	0	0	0	×	×	0	0	0	×
Libya	st	st	st	sa	st	st	st	sa	st	st	st	st	st	st	st	sa	st	st	st	st	st	st	st	st	st	st
Saudi Arabia	0	0	0	st	×	0	0	st	0	0	0	0	0	0	0	st	0	0	0	0	0	0	0	0	0	0
Syria	0	0	0	st	×	0	0	st	0	0	0	0	0	0	0	st	0	0	0	0	0	0	0	0	0	0
Other																										
Australia	st	st	st	sa	st	st	st	sa	st	st	st	st	st	st	st	sa	st	st	st	st	st	st	st	st	st	st
Burma	st	st	st	sa	st	st	st	sa	st	st	st	st	st	st	st	sa	st	st	st	st	st	st	st	st	st	st
Ceylon	st	st	st	sa	st	st	st	sa	st	st	st	st	st	st	st	sa	st	st	st	st	st	st	st	st	st	st
India	st	st	st	sa	st	st	st	sa	st	st	st	st	st	st	st	sa	st	st	st	st	st	st	st	st	st	st
Indonesia	×	×	×	st	×	×	×	st	×	×	×	×	×	×	×	st	0	×	×	0	×	×	×	×	×	×
Japan	0	0	0	st	×	×	×	st	×	×	0	0	×	0	×	st	×	0	0	0	0	0	0	0	0	0
Korea, South	0	0	0	st	0	0	0	st	0	0	0	0	0	0	0	st	0	0	0	0	0	0	0	0	0	0
New Zealand	st	st	st	sa	st	st	st	sa	st	st	st	st	st	st	st	sa	st	st	st	st	st	st	st	st	st	st
Pakistan	st	st	st	sa	×	st	st	sa	st	st	st	st	st	st	st	sa	st	st	st	st	st	st	st	st	st	st
Philippines	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Taiwan	0	0	0	st	×	0	0	st	0	0	0	0	0	0	0	st	0	0	0	0	0	0	0	0	0	0
Thailand	0	0	0	st	0	0	0	st	0	0	0	0	0	0	0	st	0	0	0	0	0	0	0	0	0	0

TABLE 4. FINANCING OF TRADE WITHIN THE WESTERN HEMISPHERE

	South America										Other Latin America									
	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador	Paraguay	Peru	Uruguay	Venezuela	Costa Rica	Cuba	Dominican Republic	El Salvador	Guatemala	Haiti	Honduras	Mexico	Nicaragua	Panama
South America																				
Argentina		×	×	×	×	×	×	×	×	—	—	—	—	—	—	—	—	[1]	—	—
Bolivia	×		×	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Brazil	×	×		×	—	—	×	0	×	—	—	—	—	—	—	—	—	—	—	—
Chile	×	—	×		—	×	0	0	0	—	—	—	—	—	—	—	—	—	—	—
Colombia	×	—	—	—		×	—	—	×	—	—	—	—	—	—	—	—	—	—	—
Ecuador	×	—	—	×	×		—	—	×	—	—	—	—	—	—	—	—	—	—	—
Paraguay	×	—	×	0	—	—		0	×	—	—	—	—	—	—	—	—	—	—	—
Peru	×	—	0	0	—	—	0		0	—	—	—	—	—	—	—	—	—	—	—
Uruguay	×	—	×	0	×	—	×	0		—	—	—	—	—	—	—	—	—	—	—
Venezuela	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—
Other Latin America																				
Costa Rica	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—	—
Cuba	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	—
Dominican Republic	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—
El Salvador	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	×	—
Guatemala	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—	—
Haiti	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—	—
Honduras	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	—
Mexico	[1]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—
Nicaragua	—	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—	—	—		—
Panama	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

[1] Payments agreement provides for financing of books and periodicals only; all other payments continue in convertible currencies.

TABLE 5. FINANCING OF TRADE AMONG MIDDLE EASTERN, ASIAN, AND PACIFIC COUNTRIES

	Middle East										Other										
	Egypt	Ethiopia	Iran	Iraq	Israel	Jordan	Lebanon	Libya	Saudi Arabia	Syria	Australia	Burma	Ceylon	India	Indonesia	Japan	Korea, South	New Zealand	Pakistan	Philippines	Taiwan	Thailand
Middle East																						
Egypt		0	0	st	0	st	×	st	×	0	st	st	×	×	×	×	0	st	st	—	0	0
Ethiopia	0		0	st	0	st	0	st	0	0	st	st	st	st	0	0	0	st	st	—	0	0
Iran	0	0		st	×	st	0	st	0	0	st	st	st	st	0	0	0	st	st	—	0	0
Iraq	st	st	st		st	sa	st	sa	st	st	sa	sa	sa	sa	st	st	st	sa	sa	—	st	st
Israel	0	0	×	st		st	0	st	0	0	st	st	st	st	0	0	0	st	st	—	0	0
Jordan	st	st	st	sa	st		st	sa	st	st	sa	sa	sa	sa	st	st	st	sa	sa	—	st	st
Lebanon	×	0	0	st	0	st		st	0	0	st	st	st	st	0	0	0	st	st	—	0	0
Libya	st	st	st	sa	st	sa	st		st	st	sa	sa	sa	sa	st	st	st	sa	sa	—	st	st
Saudi Arabia	×	0	0	st	0	st	0	st		0	st	st	st	st	0	0	0	st	×	—	0	0
Syria	0	0	0	st	0	st	0	st	0		st	st	st	st	0	0	0	st	st	—	0	0
Other																						
Australia	st	st	st	sa	st	sa	st	sa	st	st		sa	sa	sa	st	st	st	sa	sa	—	st	st
Burma	st	st	st	sa	st	sa	st	sa	st	st	sa		sa	sa	st	st	st	sa	sa	—	st	st
Ceylon	×	st	st	sa	st	sa	st	sa	st	st	sa	sa		sa	st	st	st	sa	sa	—	st	st
India	×	st	st	sa	st	sa	st	sa	st	st	sa	sa	sa		st	st	st	sa	×	—	st	st
Indonesia	×	0	0	st	0	st	0	st	0	0	st	st	st	st		×	0	st	st	—	0	0
Japan	×	0	0	st	0	st	0	st	0	0	st	st	st	st	×		×	st	st	×	×	×
Korea, South	0	0	0	st	0	st	0	st	0	0	st	st	st	st	0	×		st	st	—	0	0
New Zealand	st	st	st	sa	st	sa	st	sa	st	st	sa	sa	sa	sa	st	st	st		sa	—	st	st
Pakistan	st	st	st	sa	st	sa	st	sa	×	st	sa	sa	sa	×	st	st	st	sa		—	st	st
Philippines	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—	—		—	—
Taiwan	0	0	0	st	0	st	0	st	0	0	st	st	st	st	0	×	0	st	st	—		0
Thailand	0	0	0	st	0	st	0	st	0	0	st	st	st	st	0	×	0	st	st	—	0	

The Effect of Income Expansion on the Quantity of Money

J. J. Polak and William H. White*

THERE IS AMPLE theoretical and empirical evidence that income expansion and inflation are often associated with increases in the money supply. Since, as a rule, monetary statistics are readily and currently available while inflationary pressure is a concept that is hard to measure, it has become customary to accept monetary statistics as reliable indicators of inflation and deflation, of expansion and contraction. When it is observed that the money supply in a country is rising, it is inferred that expansionary factors must be at work and that anti-inflationary policies should be introduced. Likewise, when the money supply declines, it is inferred that contractionary forces are more powerful and that anti-inflationary policies can safely be relaxed or reversed.

In its Annual Reports for 1951 and 1952, the Netherlands Bank has drawn attention to a different relationship between inflation and the money supply, with particular reference to countries with an open economy. "The course of events during 1950 and 1951 showed clearly that, in the conditions which exist in the Netherlands, a decrease in the volume of money may be a symptom of inflationary strains; while on the other hand an increase in the volume of money may show that there is a movement in the direction of disinflation."[1] More specifically, the period from the latter part of 1950 through the first half of 1951 was without doubt one of inflation in the Netherlands; but the money supply *fell* in the fourth quarter of 1950 and in the first two quarters of 1951. The economic position was reversed around the middle of 1951, and the second half of that year, as well as the whole of 1952, was characterized by disinflationary or mild deflationary conditions; during that period the money supply consistently *rose*.

It appears, then, that the direction of change in the quantity of money

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Mr. White, economist in the Finance Division, received his undergraduate and graduate training at Harvard University. He has contributed papers to several economic journals.

[1] The Netherlands Bank, *Report for the Year 1951*, p. 52. Certain qualifications are spelled out in more detail in the *Report for the Year 1952*, pp. 49–50.

is by no means an unequivocal indicator of the direction in which the economy is moving. An increase in the quantity of money may point either to inflationary strains (expansion) or to the presence of contractionist tendencies. It is necessary, therefore, to analyze the relation between changes in income and changes in the quantity of money in order to develop a theory of more general applicability.

The present analysis consists of two parts, of which the first is a theoretical study of the relation between domestic income expansion and the money supply in an open economy. The income expansion may be due to a variety of impulses, such as an autonomous increase in domestic spending by the government, by private investors, or by private consumers. Unless the supply situation in the country is fully inelastic, the income expansion will affect not only money income, but real income as well. This study is not concerned with the effect of impulses coming from abroad; in view of this limitation, the terms "increase in income" and "decrease in income" refer to changes in activity and in income due to changes in domestic demand conditions. In order to be able to draw conclusions with respect to the net effects of these internal movements on the balance of payments, an unchanged situation in other countries is assumed: the balance of payments will then reflect only the results of the changes of domestic origin in the country under consideration.[2]

The conclusion of this part of the analysis is that, in an open economy, income expansion caused by a rise in private domestic investment, in consumption, or in government expenditure, *provided* it is not directly or indirectly financed largely by the central bank will, after a certain lapse of time, lead to a decrease in the quantity of money; and that the reverse causes, a fall in private investment, private consumption, or government expenditure, *provided* it is not matched in large part by a contraction of central bank credit, will lead, after a certain lapse of time, to an increase in the quantity of money. A more formal treatment is given in the Appendix.

It would follow, therefore, that caution should be used in drawing the traditional inferences from observed changes in the quantity of money. While very large increases could hardly occur without the presence of some inflationary central bank action, more moderate increases could well be an indication of contraction in the economy which, if verified by other indicators, could justify expansionist policies. Conversely, declines in the money supply may be an indication of an inflationary process running its course and could signal a need for anti-inflationary policies to

[2] Short-term capital movements of a "balancing" character are also assumed to be absent—a simplification that is justified either by the prevalence of controls over capital or by the fact that the influence of a worsened balance of payments will reduce confidence in the currency and thereby counter the influence of concomitant increases in interest rates.

reinforce the contractionary effect exercised by the fall in the money supply itself.

The second part of the analysis is statistical. Its purpose is to determine quantitatively the length of the critical time period on which the theoretical analysis gives only qualitative information. The very tentative finding of this statistical investigation is that for countries in which foreign trade plays a considerable role, i.e., in practice for almost all countries except the United States, the critical time period would appear to be less than one year.

In the first half of the statistical inquiry, an attempt is made to measure for a large number of countries three of the five relevant coefficients that determine the critical time period. These are ratios which may be assumed to be reasonably constant for each country and whose measurement presents relatively few problems.

The measurement of elasticities with respect to the rate of interest of the demand and supply of money raises many more problems. The second part of the statistical inquiry represents a tentative endeavor in this field, applied to the United States only.

The statistical measurement of the elasticity of demand for money with respect to the rate of interest—i.e., the slope of the "liquidity preference function"—is believed to have importance beyond the scope of the present paper. It indicates the extent to which the success of a monetary policy intended to achieve effects in the real sphere by changing the cost of money may be misjudged if attention is directed to the responses of the economy with respect to the holding of money rather than with respect to the holding or acquisition of real assets.

Theoretical Analysis

Analysis Without Regard to Time

The possibility that a change in the quantity of money may be associated with a change in income either in the same or in the opposite direction can be explained if both relationships are seen as partial theories, each paying attention to a particular aspect of the inflationary or deflationary process.

When income expands in an open economy, the money supply will be subject to two different pressures. On the one hand, there will be a tendency for the money supply to increase. Expansion of investment activity will require additional credit from the banks. The expansion of income which goes along with expansion of investment (through the operation of the multiplier) will lead to an increased desire to hold cash for use in transactions. Thus there is not only an initial temporary demand on the banks in order to finance the additional investment, but also

a lasting increase in the stock of money to facilitate the larger flow of payments associated with a higher national income.

At the same time, there will be an opposite tendency. Higher incomes will lead to higher imports. Exports will tend to decline as more resources are absorbed internally. If the balance of payments was just in equilibrium before the expansion phase started, it will now show a deficit. The public will buy more foreign exchange from the banks than it sells to the banks and, in the process, will reduce its holdings of money by an amount equal to the net reduction in the country's foreign exchange holdings. As the reserves of the banking system decline, and the central bank takes no steps to offset this decline, the banking system will wish to have less money outstanding.

Here it is assumed that the central bank adheres to a moderate form of the "rules of the game" in that, on the one hand, it does not offset the loss of reserves by the commercial banks (e.g., by open market purchases of securities) but, on the other hand, does not act to contract further the quantity of money by attempting, for instance, to restore the previous ratio of its foreign assets to its sight liabilities. It is similarly assumed that the central bank does not itself finance the greater part of the expansionary impulses which give rise to the increase in income.

These assumptions regarding central bank behavior are important in determining the outcome of the analysis; very different assumptions would lead to quite different results. For example, if the central bank fully finances a government deficit, the reserve base of the commercial banking system will increase more from this action than it will decline from the increase in imports to which the associated income expansion will give rise.[3]

The desire of the public for more money and the wish of the banks to contract the money supply cannot be reconciled without bringing in another element. The two tendencies can be reconciled as soon as both the demand for money and the supply of money are considered in the schedule sense and a price, in this case the rate of interest, is brought into play as the equilibrating factor. The public wants more money at a given rate of interest, but it will squeeze its holdings of money as they become more expensive. The banks want a smaller money supply, but they are willing, within limits, to give in to the pressure for more money by squeezing their reserve ratios as the rate of interest goes up.

The end result must be an increase in the rate of interest; there may be an increase or a decrease of the money supply depending on a number of elements which can most conveniently be discussed by means of a chart.

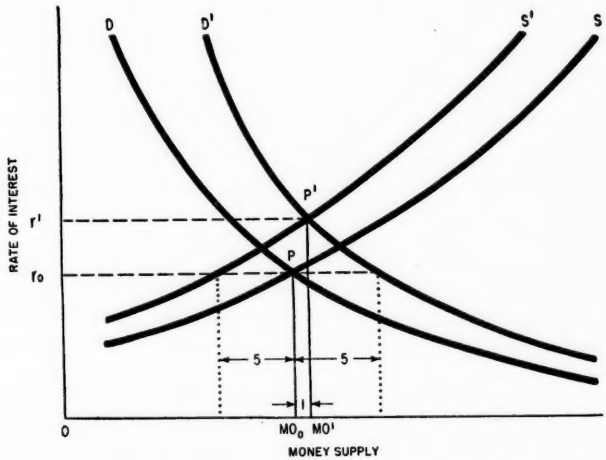
In Chart 1, the demand (D) and supply (S) of money are plotted. The curves D and S indicate the initial equilibrium situation before the be-

[3] See Appendix, Section II.

ginning of the expansion process. The initial money supply is indicated as MO_0. This satisfied the public's demand for money at the given rate of interest, r_0, and at the given level of income which determines the position of the demand schedule. The same money supply, MO_0, also satisfied the banks, given the rate r_0 and their reserve position which determines the position of the supply schedule.

A once and for all rise, thereafter sustained, of the national income of 10 million (of national currency units) above the previous equilibrium situation is now assumed. To make the higher payments, the public will want more money. If the income velocity of money is, say, 2, the

CHART 1



desired increase in the quantity of money would be 5 million. This is indicated in the chart by a new demand curve D^1, 5 units to the right of curve D.

Suppose that the 10 million higher level of income persists for one year, and that the marginal propensity to import[4] is 0.2. Then the country would lose 2 million in reserves. At the end of the year, therefore, the banking system's supply curve of money will have moved to the left (to S^1). The distance of the shift can be expressed in units comparable to the shift of the demand curve. It will depend on the loss of international reserves and on the reserve ratio (the ratio of reserves to deposit liabilities *plus* currency in circulation) of the commercial banks. Suppose the latter

[4] Defined as the ratio of the change in the trade balance to the change in income by which it is caused (see page 411).

ratio is 40 per cent.[5] Then at the given rate of interest the banking system will want to contract the money supply at the end of one year by 2.5 × 2 million = 5 million. Under these numerical assumptions, it so happens that the supply curve S^1 in Chart 1 is moved to the left by the same distance as the demand curve is moved to the right.

The new rate of interest r' and the new quantity of money MO' are found by the intersection of the D' curve and the S' curve (at P'). The rate of interest, r', is higher than r_0, and the quantity of money, MO', is higher than MO_0. However, the increase in MO is small, i.e., 1 million.

The increase in the rate of interest needs no comment. But the fact that there is an increase in the money supply and not a decrease is clearly due to the numerical assumptons made. An equal horizontal shift (with opposite sign) of the demand and the supply curves has been obtained by assuming a particular numerical relationship between the income velocity of money, on the one hand, and the marginal propensity to import and the banks' reserve ratio, on the other hand. Specifically it has been assumed that

$$\frac{1}{\text{income velocity of money}} = \frac{\text{marginal propensity to import}}{\text{banks' reserve ratio}}$$

$$\left(\text{e.g., in the simplified case outlined above, } \frac{1}{2} = \frac{0.2}{0.4}\right).$$

These figures are plausible for certain countries although there is no particular reason why the shift of the demand curve should not be greater or smaller than the shift of the supply curve.

Equal shifts having been assumed, the result as far as MO' is concerned depends on the relative elasticity of the two curves. In Chart 1, S and S' have been drawn as more elastic (flatter) than D and D'. Accordingly, P' lies to the right of P and MO' is greater than MO. The increase of the rate of interest from r_0 to r' would by itself induce the banks to expand the money supply by 6 million. It would induce the public to compress their demand for money by 4 million. The combination of these movements along the curves with shifts of 5 million in both curves leads to a new equilibrium position in which the public holds 5 − 4 (= 1) million more money and the banks have an increase in their liabilities of 6 − 5 (= 1) million.

[5] For example, assume that an expansion of the money supply of 5 units consists of 4 in deposits and 1 in currency; if the legal plus conventional cash reserves against deposits are 25 per cent, there will be a rise in required reserves of 1. At the same time, the associated withdrawal of 1 unit of currency from the banks will use up 1 unit of bank reserves; allowance for this loss of reserves is made most conveniently by treating it as being simply a 100 per cent "reserve" requirement against currency "liabilities." On this basis, the total reserve requirement for 5 units of money is 2. Therefore, if gold and foreign exchange reserves decline by 2, the banks' supply schedule is moved to the left by 5.

It is clear that if elasticity had been assumed to be greater for the public than for the banks, instead of smaller, the quantity of money would have shown a decrease.

Subject to what is to be said below—and this is an important qualification—it has been found that, if central bank action is in accordance with the assumptions made above, the following five factors will determine whether changes in the quantity of money and changes in income are in the same or in opposite directions:

1. The income velocity of money
2. The marginal propensity to import
3. The reserve ratio of the banking system
4. The elasticity of demand for money[6] with respect to the rate of interest on the part of the public
5. The elasticity of supply of money with respect to the rate of interest on the part of the banks.

If the first three factors happen to be such that the shifts of the demand and supply curves are of equal magnitude, the money supply increases when the fourth factor is less than the fifth, and decreases when it is greater.

Dynamic Analysis

In the preceding section the time dimension has deliberately been glossed over. It is necessary now to become more specific on this point.

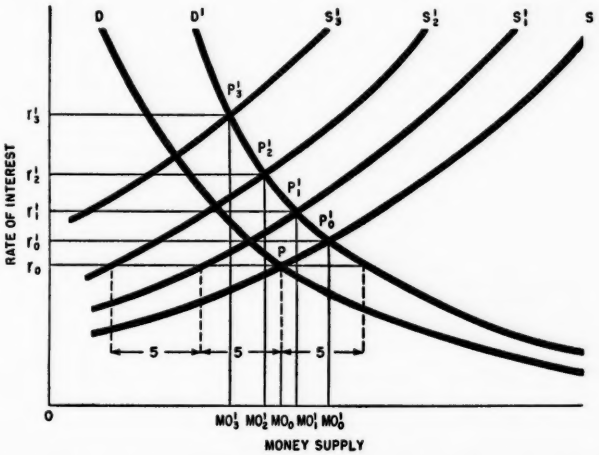
On closer analysis it becomes clear that the shift of the demand curve and the shift of the supply curve are not of the same character. On the assumption made, i.e., a single but sustained rise in the level of income, the shift of the demand curve may be considered as a once and for all shift. As soon as income (expressed as an annual rate) increases by 10 million, and as long as it remains at this higher level, D', being 5 million to the right of D, will represent the demand for money. The shift in the supply curve is different. It is a movement over time, caused by the loss of reserves over time. S' has been drawn quite arbitrarily at the point corresponding to a *one year* period of higher income. If income stays at the same level for another year, another 2 million of imports above the normal level will have been wanted, and reserves will have been reduced

[6] The same elasticity of demand is assumed for currency as for deposits. While in fact the desire to hold currency is probably less responsive to changes in interest rates than the desire to hold deposits, it is usually considered the legitimate function of central banks to reimburse commercial banks for any loss of reserves resulting from an "internal currency drain" associated with an abnormal rise in the ratio of currency to deposit money; the central bank here is assumed to operate according to this practice. If a lower interest elasticity of demand for currency were not so offset, the decline in the money supply in response to an increase in income would tend to be much more rapid. This case is treated in Section III of the Appendix.

by another 2 million. Accordingly, the supply curve will shift another 5 units to the left.

In Chart 2 the dynamic development of the money supply is presented in a general form. Curves D, D', and S are the same as in Chart 1. Curve S_1' is the same as S' in Chart 1; the suffix 1 is attached to denote the particular timing of the curve, i.e., after one year.

CHART 2



Changes in the quantity of money can be read along the horizontal axis. At the very beginning of the year when income is 10 million higher than in the preceding year, the banks have not yet lost any reserves. Their supply schedule is, therefore, still practically unchanged at S. The intersection of D' with S gives P_0', which indicates the rate of interest, r_0', and the quantity of money, MO_0', at that time. This money supply must be larger than MO_0, whatever the numerical values of any of the five factors. After one year, we will have MO_1' and r_1' which are equal to MO' and r' in Chart 1. The supply curve continues to move to the left, and at the end of two years the money supply (MO_2') is now clearly below the original money supply. As time goes on and income remains at the given level, the money supply will continue to fall.

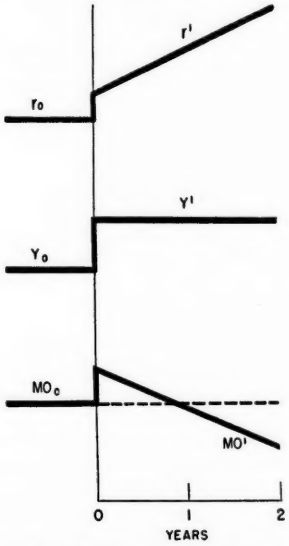
Chart 3 shows the movement over time of income, the rate of interest, and the quantity of money on the basis of the findings in Chart 2.

The conclusions derived from the dynamic analysis are as follows: (1) Initially, an increase in income will lead to an increase in the quantity of money. (2) As the same higher level of income persists for a longer

time, it will lead to a reduction in the quantity of money below the higher level initially reached. (3) If the same higher level of income persists for a long enough period, it will lead to a quantity of money below the level that existed before the increase in income occurred.

These three propositions have general validity for an increase in income for which the associated import surplus is not *entirely* compensated by central bank financing. They do not therefore depend on any particular numerical magnitudes of the five coefficients mentioned above.

CHART 3



The third proposition is of little importance, however, unless it can plausibly be expected that an increased level of income will actually produce a decline in the money supply below the level previously existing within a small number of years. To answer this question, we have to turn to evidence regarding the numerical magnitude of the factors involved; this will be examined below. Before the statistical aspect of the problem is considered, however, two further theoretical aspects require discussion.

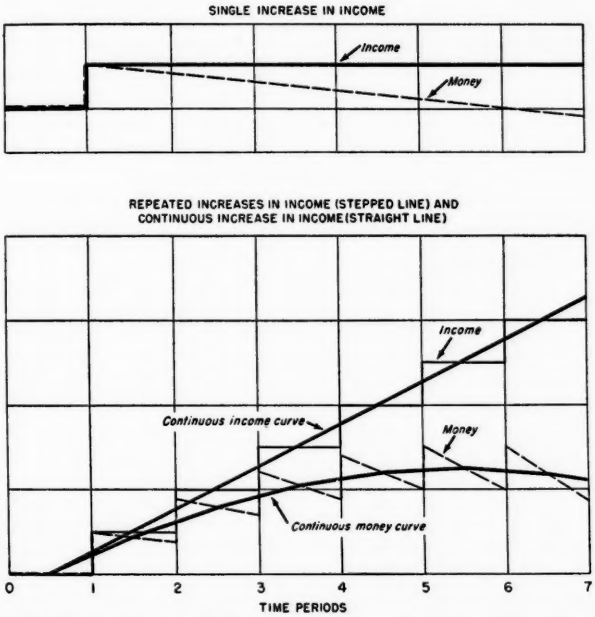
GRADUAL INCREASE IN INCOME

The preceding analysis has been concerned with one sudden increase in income which was then assumed to be maintained for some time. A

somewhat different aspect of the same problem may now be considered. Let us assume a continuous rise in income. How, under the assumptions made, will the quantity of money vary? Specifically, what are the conditions under which, given expanding income, the money supply of one period can fall below the money supply of the *preceding* period (in contrast to the conditions under which it falls below the initial, pre-inflation money supply)?

The answer to this question can be derived from Chart 4. The top half of this chart repeats the relationship for the one-time increase in

CHART 4



income. In the bottom half, income is shown rising by one step per time unit. At every step, the quantity of money initially rises correspondingly (the scales have been selected in such a manner that the rise in the quantity of money at each step shown on the chart equals the rise in income). But as the time period during which income remains at a given step passes, the quantity of money falls, for bank reserves are continuously drained off by the excess of imports over exports. From time moment 1 to moment 2, it falls by one fifth of a step, i.e., with the same slope as the money curve in the top half of the chart. During the next

period, from moment 2 to moment 3, it falls by two fifths of a step—one fifth each for the first and second income step.[7] In the next period it declines by three fifths of a step, etc. After income has risen for five time units, the decline in the quantity of money per unit resulting from the shift to the left of the supply curve just equals the rate of increase in the quantity of money resulting from the shift of the demand curve. The two forces balance; the quantity of money reaches its maximum. Thereafter, as income continues to grow at the same rate, the cumulative effect on the supply side of past growth in income exceeds the effect of current income growth on the demand side, and the quantity of money will decline.

Instead of by steps, the same reasoning can be presented by continuous curves. If income rises as a straight line, the quantity of money will increase at a decreasing rate, then reach a maximum, and decline thereafter. It can easily be understood on the basis of Chart 4 that the money curve in this case will reach its maximum after the same number of time periods that it takes the curve in the top half of the chart to decline to the initial level.

In summary, therefore, in the circumstances here postulated, a continuously increasing rate of income will lead first to an increasing, then to a decreasing, quantity of money. The maximum for the quantity of money will be reached after a period of time depending on exactly the same combination of five parameters as that found in an earlier section (pp. 401–4). Thus the period of time which must elapse before the money supply falls below its initial level in the single income increase case is exactly the period which must elapse before the money supply can fall below its *immediately previous* level in the continuous inflation case.[8]

Effect of the Rate of Interest on Income

In describing the process of changes in income and money over time, any possible effect of the rising rate of interest on investment or saving, and thereby on income, has been left out of account. This manner of treatment is not necessarily unrealistic. While the increase in the rate of interest will necessarily have some restraining effect on investment, it is quite likely that the accompanying increase in income will tend to stimulate investment.

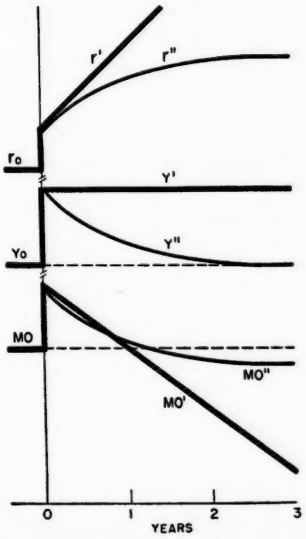
[7] In comparison with the situation of the first step, the income level of the second step is twice as much above the initial equilibrium level, so that the import surplus is twice as great and hence the loss of reserves and the consequent leftward shift of the supply curve are twice as great.

[8] The appearance of a maximum for the quantity of money is accelerated if income increases at a decreasing rate, and delayed if income increases at an increasing rate.

It may be useful, nevertheless, to expand the analysis to cover the situation where, as a result of the rise in the rate of interest, investment actually declines (and/or savings actually increase) and, consequently, income will decline in spite of the persistence of autonomous factors of unchanged magnitude. For instance, government spending may be maintained at x million above the level of the original equilibrium situation; but the consequent persistent rise in the rate of interest may reduce private investment by y per year. While at first the annual rate of income will exceed the original level by x times the multiplier, it will decline to $(x - y)$ times the multiplier after one year, $(x - 2y)$ times the multiplier after two years, etc.

The effect of the expansion of the analysis can, again, be represented graphically by an extension of Chart 3. This is done in Chart 5; the mathematical deductions will be found in the Appendix.

CHART 5



Income, instead of remaining at its raised level, will now gradually decline until it approaches asymptotically the original level. The rate of interest will rise, not in a straight line and without limit but asymptotically approaching a maximum. This maximum will be such that the negative effect of the rate of interest on investment (plus the negative effect it has on consumption through increasing saving) will just balance

the initial autonomous increase in expenditure. The quantity of money will decline, after its initial rise, and approach an asymptote below its base period level. The level of this latter asymptote will depend on the amount of autonomous investment and the ratio between the responsiveness of the demand for money and of investment, respectively, to the rate of interest.

As Chart 5 indicates, the general nature of the process for reasonably short periods of time is not greatly different from that shown in Chart 3. The point of intersection of the *MO* curve with the zero line may fall somewhat earlier or somewhat later. Even those instances in which the quantity of money returns to its base-period level at a later time do not affect significantly our earlier findings, since (a), within the plausible range of values for the various parameters, the lengthening of the time period is quite small; and (b), when the simpler analysis yields a time period of less than one year, the present, more complicated, analysis must also yield a period of less than one year, while for a time period of just one year the results of the two methods coincide.[9]

Statistical Measurements

The direction of the movement of the money supply in response to change in income has been found in the circumstances assumed in this study to depend on five coefficients and on time. Three of these coefficients—(1) the effect on the demand for money of a change in income, (2) the effect of a change in money on commercial bank reserves, and (3) the effect of a change in income on imports—are conveniently discussed together. They have in common the characteristic that marginal coefficients may be estimated on the basis of certain average ratios. The two elasticities are examined separately in later sections of this paper.

Coefficients Derived from Average Ratios

The analysis calls for coefficients reflecting certain marginal coefficients: (1) the marginal desire of the public to hold money as income changes, (2) the marginal desire (or obligation) of the banks to hold reserves as deposits change and the marginal need to provide currency as the supply of money changes; and (3) the marginal desire to import as income changes. These coefficients should be interpreted in the "partial" sense: they are to reflect the change in the dependent variable on the assumption that only the specified independent variable changes.

It is believed that estimates of sufficient accuracy for the present analysis can be derived on the basis of the two following assumptions:

[9] Numerical examples of (a) and a mathematical proof of (b) are given in the Appendix.

(1) that the marginal coefficients concerned are reasonably close to the corresponding average coefficients; and (2) that the actual effects of changes in other variables (including changes in interest rates) are not so great as to make the observed values of the average coefficients vary widely over time.

If these two assumptions are accepted, it follows that the coefficients sought can be approximated by taking the observed average ratios of the variables concerned in each of the three cases.

For the first coefficient the empirical ratio of the money supply to national income (for a few countries, GNP) is taken (see Table 1, Column 1).

The second coefficient involves two steps: the ratio of deposits to the total money supply and the ratio of commercial bank reserves[10] to deposits. If the former ratio is called d and the latter f, an increase in the money supply of M will involve a drain on the reserves of the commercial banks of $(1 - d)M$ for the currency part of the increase, dfM for the deposit part of the increase, or a total of $(1 - d + df)M = [1 - d(1 - f)]M$ (Table 1, Columns 2, 3, 4).[11]

Assumption (1) above may be open to some doubt with respect to the propensity to import (Column 5). Existing statistical studies almost generally show that the marginal propensity to import appears to be in excess of the average propensity to import. In other words, the income elasticity of imports—which is the ratio of the marginal to the average propensity to import—is generally found to be above 1. A comparison of 21 marginal propensities to import for 16 countries in the interwar period (for some of the countries separate measurements were made for the

[10] The present study considers only "cash" reserves (currency, central bank deposits, etc.). While a number of countries have very high commercial bank reserve requirements, with most of the reserves allowed (or required) to be placed in government securities, it is assumed that the government securities to be held as reserves are acquired or sold by the banks in dealings with the public, with other banks, or sometimes, with the government. Only where the central bank or government provides the securities as needed and holds the monetary proceeds of the transaction idle would the government security component of reserves have to be included.

[11] It will be noted that the ratios for f in Column 3 of Table 1 vary widely, from as low as .04 for Japan to as high as .70 for Honduras. There may well be reason to doubt the significance of either the very low or very high ratios. Very low ratios are probably an indication that the definition of reserves used for the particular country does not adequately reflect all the assets that are kept—whether legally or conventionally—as reserve requirements. A very high ratio may reflect the inclusion in reserves of certain assets which do not in fact represent first line liquidities.

In order to evaluate the effect of the use of possibly unrealistic values for f in the calculations, alternative calculations were made for all countries, based on $f = .10$. It was found that this alternative value for f did not affect the value for the combined ratio (Column 6) for most countries, and in almost all other cases changed it only very slightly. The most important change found was for New Zealand, where the combined ratio would fall from .6 to .3 if a value for f of .10 were substituted for the value of .39 in the table.

TABLE 1. RATIO COEFFICIENTS FOR 38 COUNTRIES IN 1952

Country	Ratio of Money Supply to Income (1)	Reserve Effect[1] d (2)	Reserve Effect[1] f (3)	Reserve Effect[1] $1-d(1-f)$ (4)	Ratio of Imports to Income (5)	Combined Ratio[2] (6)	Ratio of Short-Term Debts to Money Supply (7)
Europe							
Austria	.30	.53	.12	.53	.22	.7	.46
Belgium	.57	.40	.07	.63	.39	.9	.23
Denmark	.32	.73	.10	.34	.31	.4	.73
Finland	.12	.40	.09	.64	.30	.3	1.14
France	.41	.49	.07	.54	.15	1.5	.55
Germany	.21	.51	.35	.67	.16	.9	.89
Ireland	.40	.56	.08	.49	.43	.5	.76
Italy	.41	.60	.13	.48	.18	1.1	.77
Netherlands	.45	.61	.06	.43	.48	.4	.20
Norway	.51	.67	.07	.38	.38	.5	.89
Sweden	.25	.56	.07	.48	.22	.5	.96
Switzerland	.57	.56	.22	.56	.26	1.2	.58
United Kingdom	.39	.73	.09	.34	.25	.5	.33
Commonwealth Countries							
Australia	.44	.76	.08[3]	.30	.33	.4[3]	.54
New Zealand	.38	.76	.39	.54	.36	.6	.56
Union of South Africa	.37	.79	.25	.41	.37	.4	.44
Canada	.29	.73	.10	.34	.22	.4	.65
Middle and Far East							
Burma	.19	.35	.23	.73	.22	.6	.26
Ceylon[4]	.20	.60	.29	.57	.39	.3	.18
Egypt[5]	.42	.48	.27	.65	.23	1.2	.36
Israel[4]	.47	.63	.32	.57	.23	1.2	.57
Japan[4]	.22	.53	.04	.49	.41	.3	1.45
Philippines	.15	.43	.19	.65	.12	.8	.61
Thailand[5]	.18	.27	.41	.84	.12	1.3	.18
Turkey[5]	.26	.57	.13	.51	.15	.9	.98
United States	.44	.79	.22	.38	.04	4.2	.40
Latin America							
Argentina[4]	.40	.47	.11	.58	.14	1.7	.48[5]
Brazil[4]	.39	.69	.26	.49	.16	1.2	.73[5]
Chile[5]	.17	.66	.12	.42	.11	.6	.78
Colombia[5]	.17	.52	.19	.56	.13	.7	.04
Cuba[4]	.73	.36	.46	.81	.32	1.8	.22[5]
Dominican Republic	.15	.55	.31	.62	.19	.5	.40[5]
Guatemala	.12	.33	.54	.85	.14	.7	.28[5]
Honduras[4]	.13	.46	.70	.86	.26	.4	.49[5]
Mexico[5]	.16	.51	.58	.79	.13	1.0	.33
Paraguay[4]	.22	.46	.65	.84	.09	2.0	.33[5]
Peru[4]	.19	.60	.17	.50	.27	.4	.78[5]
Venezuela[4]	.23	.50	.48	.74	.30	.6	.45[5]

[1] d = ratio of deposits to total money supply; f = ratio of commercial banks' reserves to deposits. [2] $\frac{\text{Col. (1)} \times \text{Col. (4)}}{\text{Col. (5)}}$ [3] Australia's actual f may be made extremely high for increases in deposits, according to central bank decision. The combined ratio would then rise to a maximum of 1.1. [4] 1951. [5] 1950.

twenties and the thirties) with the corresponding average propensities yielded 7 cases of elasticities in excess of 2.0, 10 between 1.0 and 2.0, and only 4 below unity.[12]

These high import elasticities, however, are based on comparisons of real income and real imports. Much lower elasticities would be indicated insofar as changes in money income are due to price changes. With respect to the latter, the balance of trade expressed as a percentage of imports would probably worsen by less than the increase in the price level; i.e., the rise in money value of imports (plus any fall in value of exports) would be less than in proportion to the rise in money income.[13] On the whole, therefore, the assumption of unitary elasticity of the demand for imports with respect to income, both expressed in terms of money value, would not seem to be too unreasonable. The figures in Column 5 of Table 1 have therefore been obtained simply by dividing imports by national income.

In Column 6 of Table 1, the three coefficients are combined in the manner in which they are relevant for our calculations. In terms of Charts 1 and 2, the figures in this column represent the ratio of the displacement of the demand curve for money to the displacement of the supply curve for money after one year. If this ratio is less than unity it means that, at equal interest elasticities of demand and supply for money, the quantity of money would fall below the initial position within one year after the beginning of a higher level of income. Conversely, these ratios provide a critical value for the ratios of the interest elasticities. Thus, for the first country in the table, Austria, the combined ratio is found to be .7. This can be interpreted as meaning that, if the interest elasticity of the demand for money is anywhere above .7 times the interest elasticity of the supply of money, the quantity of money (given the assumptions listed above about central bank neutrality, etc.) will fall below the initial position within a year after an increase in income.

Table 1 therefore gives information on the crucial question of the parallel or opposite movement of money supply and income only if plausible assumptions can be made regarding the ratio of the two interest elasticities and if, furthermore, the time is stipulated during which changes in income may be assumed to persist. It will be shown below

[12] For this comparison, see J. J. Polak, *An International Economic System* (London and Chicago, 1954), Synoptic Table. Figures are not given in the source. Similar high elasticities were also found by T. C. Chang, "International Comparison of Demand for Imports," *Review of Economic Studies*, Vol. XIII, No. 2 (1945–56), table, p. 64. Some of Chang's findings, however, may not be fully comparable since they represent employment rather than income elasticities.

[13] Unit price elasticity of the balance of payments would require that at least either the country's import demand or the foreign demand for its exports be elastic; but in the fairly short run considered in this study both elasticities may well be below unity.

that there seems to be evidence that in the United States, at least, the demand elasticity for money exceeds considerably the supply elasticity, their ratio being about 4 to 1 in the postwar period. There is no particular reason to believe that similar results might not be found for other countries. In Table 2, the results are summarized, assuming three al-

TABLE 2. ESTIMATES OF LENGTH OF TIME (IN YEARS) BEFORE INCREASE OR DECREASE IN INCOME WOULD LEAD TO AN OPPOSITE MOVEMENT IN MONEY SUPPLY

Interest-Elasticity Ratio[2] \ Combined Ratio[1]	0–½	½–1	1–2	2 and Over
2	0–¼	¼–½	½–1	>1
1	0–½	½–1	1–2	>2
½	0–1	1–2	2–4	>4
	Countries in Each Combined Ratio Class			
	Denmark	Austria	France	
	Finland	Belgium	Switzerland	
	Ireland	Germany	Italy	
	Netherlands			
	Norway			
	Sweden			
	United Kingdom			
	Australia	New Zealand		
	Canada			
	Union of South Africa			
	Ceylon	Burma	Egypt	
	Japan	Philippines	Israel	
		Turkey	Thailand	
				United States
	Dominican Republic	Chile	Argentina	
	Honduras	Colombia	Brazil	
	Peru	Guatemala	Cuba	
		Mexico	Paraguay	
		Venezuela		

[1] Based on data in Table 1, Column 6.
[2] Ratio of "Interest Elasticity of Demand for Money" to "Interest Elasticity of Supply of Money."

ternative, more conservative, values for the ratio of the two elasticities, *viz.*, 2, 1, and ½. For each value of the "combined ratio," Table 2 enables us to estimate the period of time during which an increase in in-

come would have to persist to lead to a decrease in the money supply. The table shows that on the first assumption, *viz.*, the demand for money twice as elastic as the supply of money, 37 of the 38 countries (all except the United States) would show an opposite movement between the quantity of money and national income within a year, and 27 would show it within half a year. At the other extreme shown (which, of course, is not in any sense either a logical or an empirical extreme), where the ratio of the elasticities is the reverse, 15 of the countries would still show an opposite movement after a year, and 27 would show it after two years, had elapsed.

One qualification of these findings needs discussion. The elasticity of demand on the side of the public has been discussed in terms of a comparison of the relative advantages of liquidity (the holding of money) with its cost in the form of the interest foregone by not holding an interest-yielding asset. This comparison may not be the predominant factor in determining the elasticity of demand. For many business firms the cost of liquidity may rather be the interest to be paid on short-term borrowing from the banks; and for them the choice may present itself primarily in the form of a comparison of the advantages of short-term bank credit with its cost. This aspect of the interest elasticity of demand for money is particularly interesting because data are available which permit intercountry comparison of elasticities.

In general, it would seem reasonable to assume that in countries where the ratio is high the interest elasticity of demand for money will be higher (all other things being equal) than in countries where the ratio is low. For most countries this ratio in 1952 was well above that for the United States (Table 1, Column 7). On this score, at least, there appears to be no reason to fear that the transposition of an elasticity found for the United States would lead us to underestimate the critical period.

Elasticity of the Public's Demand for Money

In order to find the responsiveness of the public's demand for money with respect to the rate of interest, we must attempt to isolate *one* of the factors determining the total demand for money. The primary factor determining this demand is usually believed to be the total value of business turnover, measured by some indicator such as the value of GNP. Here we want to abstract from this "income" factor in order to isolate the "price" factor. One possible procedure would be to attempt a multiple correlation calculation explaining movements in the quantity of money in terms of both an income and a price factor. This is the procedure followed by Tinbergen for the interwar period.[14] By this procedure

[14] J. Tinbergen, *Business Cycles in the U.S.A., 1919–1932* (League of Nations, Geneva, 1939), pp. 100–101.

he found for the United States a very low elasticity with respect to the interest rate: a decline of $420 million (or about 1 per cent of the average amount outstanding during the period) in deposit money (demand plus time deposits) held by the public for every 1 per cent increase (e.g., from 3 to 4 per cent) in the short-term rate of interest. This figure seems extremely low on a priori grounds; and like so many price elasticities where the income elasticity is dominant, it is probably subject to a wide margin of error.

An alternative method of measurement therefore seems more appropriate. The essence of this method is to determine the income coefficient from other sources. It seems plausible that, at a given rate of interest, businesses and consumers would vary the cash balances they want to hold proportionally with their transactions. If a business turnover of $10 million per year requires for a particular firm an average cash balance of $1 million, it seems reasonable that if the business grows to $30 million, distributed over three firms, the desired cash balance should increase to $3 million. If it is reasonable to assume this proportionality more generally,[15] then it would follow that the velocity of turnover of money at given rates of interest would be independent of the total turnover. The rate of interest would then determine the rate of turnover of the money supply, and a comparison of the covariations of these two variables would indicate the effect of the rate of interest on the money supply at a given level of GNP.

As will be seen below, a comparison of this sort turns out to be quite satisfactory as an approximate indicator of the sensitivity of the quantity of money to changes in interest rates in the United States in the last 30 years.[16]

[15] Professor W. J. Baumol (in "The Transactions Demand for Cash: An Inventory Theoretic Approach," *Quarterly Journal of Economics*, November 1952, pp. 545–56) has shown that on certain simplifying assumptons an individual business minimizing its cost would vary its transactions cash holdings in proportion to *the square root* of the value of its transactions, rather than in proportion to the value of its transactions. This derivation is not, however, directly applicable to a comparison of total cash holdings to total transactions, for two reasons:

(1) The large short-run fluctuations in GNP with which we have to deal are primarily price fluctuations. When prices generally change, it seems reasonable to assume that Baumol's "broker's fee"—the administrative and psychic cost involved in changing one asset for another—would change proportionally. If this assumption is made, Baumol's formula shows that the cash holdings of an individual would vary proportionately to the general price level, and not to its square root.

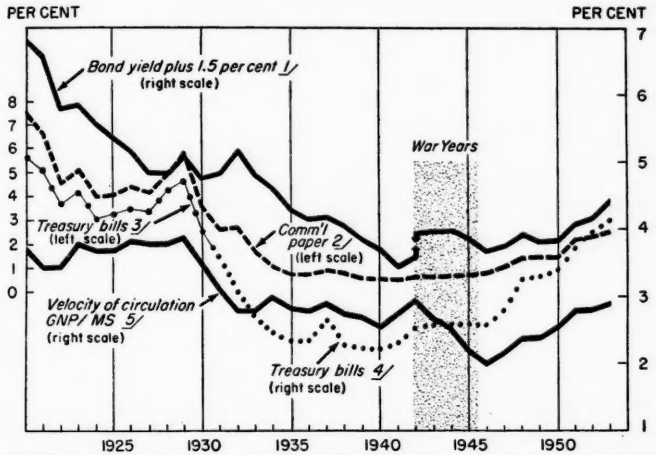
(2) A considerable part of the change in real GNP, especially over the somewhat longer run, must be due to an increase in the number of businesses to which Baumol's formula does not apply.

[16] The relationships found were checked afterward by multiple correlation calculations in order to make sure that they were not spurious in character.

Observed interest-velocity relationships in the United States, 1920–53

In Chart 6 the income velocity of circulation in the United States (defined as the ratio of GNP to money supply) is plotted for the years 1920–53, together with several interest rates. The interest rates used are the yield of 3–9 month Treasury bills, the rate on prime commercial paper, and the long-term government bond yield.

CHART 6. INCOME VELOCITY OF MONEY SUPPLY AND INTEREST RATES IN THE UNITED STATES, 1920–53



[1] Yield on long-term government bonds: 1920–42, partly tax exempt; 1942–53, taxable.

[2] Rate on prime commercial paper, 4–6 months.

[3] Average yield: 1920–30, 3–6 month Treasury notes and certificates, plus 0.25 for "linking"; 1931, Treasury bills, average rate on new issues.

[4] Average yield: Treasury bills, average rate on new issues, plus 2½ per cent.

[5] Money supply data: June 30, 1920–23; average end June (June double weighted), end December, and end December of previous year, 1924–42; average of monthly data, 1943–53. Series linked.

The use of several interest rate series rather than a single "representative" series is necessary because of the separation of the various financial markets. For example, business borrowers will build up or reduce their working balances of money in response to changes in the cost and availability of short-term commercial credit. Investors will build up or reduce their idle balances according to the rate of interest on securities. Within the security market, both the long-term and the short-term sectors have to some extent distinct clienteles; the movements of both classes of interest rates ought therefore to be considered. Thus it is necessary to

have available several interest series for judging the responsiveness of velocity to the cost of borrowing or the income from lending.

Chart 6 reveals a good correspondence in the year-to-year movements of the velocity of circulation and interest rate series: a rise in interest rates tends to be accompanied by a rise in velocity, i.e., by an economy in the holding of money.

There are a number of instances of poor correspondence between the interest and the velocity series. Several of these, however, are attributable to special factors which are irrelevant in the present context. In 1920 and 1921, the postwar speculative boom and collapse presumably distorted the interest rate-money supply relationship. The lack of response between 1927 and 1928 and the very small response between 1928 and 1929 of the velocity index to the sharp rises in interest rates are due to the somewhat limited definition of the base taken to measure this velocity. In 1928, and especially in 1929, as a result of the rise in stock market speculation, there was a great increase in the volume of those transactions which were unrelated to the size of GNP; and speculative transactions require some quantity of money for their execution. If the measure used for the total volume of transactions had contained an allowance for the abnormal rise in purely financial transactions, the rise in interest rates would have been reflected in increased velocity figures.[17] The correlation between interest rates and money supply broke down during the period between 1931 and 1934, but this failure of the relationship is again explainable by the severely disturbed conditions of the period. Special conditions also provide the basis for the breakdown of the relationship during the period 1942 to 1946: omnipresent controls modified the relationship between the use of money and the interest rate.[18]

The data on interest rates and the ratio of money supply to GNP shown in Chart 6 are reproduced in scatter diagram form in Chart 7.

Choice of representative rate of interest

To make possible measurement of the interest elasticity of demand for money by the scatter diagram technique, a single rate of interest had to be selected from Chart 6 to be plotted against desired cash holdings. The problem thus arises of finding the one rate most nearly representative of all interest rates. A rate on government securities is probably more appropriate than any rate on private loans or securities, for fear of the debtor's insolvency must have caused a varying risk-charge factor to have influenced the rate during the depression of the thirties even

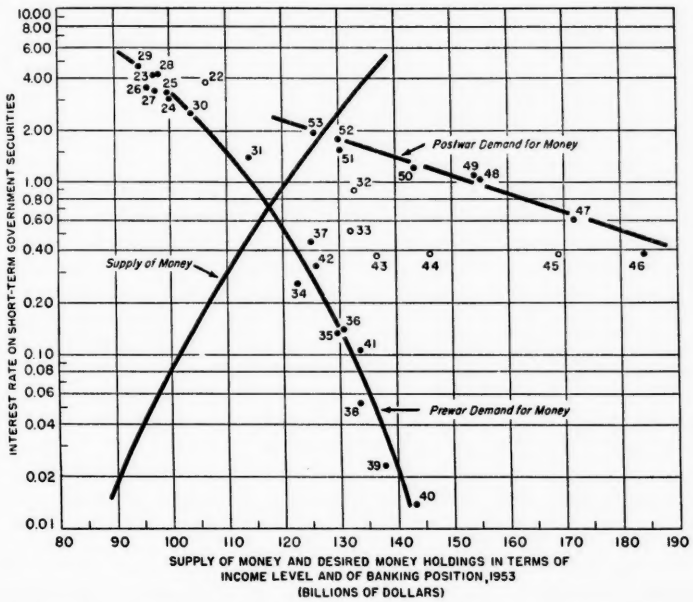
[17] The "rate of turnover of demand deposits," which moves closely in proportion to the figures used here for the velocity of circulation in other years, rose markedly above it in 1928 and 1929.

[18] The rise in Treasury bill rates from 1940 to 1941 was caused at least partly by the discontinuance of their tax exemption privilege; if that was the sole cause of the rise, then 1940–41 was also a case of nonconformity.

with respect to prime quality loans.[19] In addition, some forms of private lending are carried out to a large extent on the basis of variations in the degree of "credit rationing" rather than of allocation via the price mechanism. On the commercial loan market the banks are in the position of monopolistic competitors. Each bank recognizes the danger that

CHART 7. RELATION BETWEEN MONEY DEMAND AND SUPPLY AND INTEREST RATES IN THE UNITED STATES, 1922–53

(Logarithmic verticle scale)



raising interest charges will drive some of its clients to other banks while lowering charges will be matched by competitive reductions of charges in other banks. This consideration, plus the customs of loyalty to long-standing clients, etc., makes too frequent interest adjustment an undesirable method of changing the volume of bank loans. But the same conditions which force banks to alter the amount of business loans out-

[19] These extra risk charges are, it is true, on the same footing with the "pure" interest charge as factors in the *borrower's* decision to borrow. However, disregard of this relationship is partly justified on the ground that long-term borrowing is not generally carried out to enlarge cash balances *relative* to the level of *transactions* and long-term borrowings are not so easily repaid when the interest rate rises and cash holding is (apparently) made relatively costly. As for short-term borrowing, another consideration presented below justifies neglect of the actual cost from the borrower's viewpoint.

standing will also, *ceteris paribus*, cause them to alter the amount of government securities, etc., held. And the market for government securities is not monopolized by the banks; other investors participate in it, and the interest rates determined in it are highly sensitive to shifts of demand. Banks therefore adjust their holding of government securities (a large fraction of their total assets) without regard to the effects of their purchases or sales on the prices of these securities; thus government security yields are likely to be as good an indicator of the price-*cum*-availability of bank credit for business as the rate actually charged on these credits. And since business cash balance holdings must vary in response to the *availability* of credit just as they vary in response to the *cost* of credit, government security yields should be pertinent not only for investors who shift funds between securities and cash balances but also for borrowers who can shift between cash holdings and debts. For these two reasons, yields of government securities appear in general to be the better indexes of interest rates.

Among them a selection has to be made between long-term and short-term rates to find the more desirable single representative measure of the yield of capital. The short-term rate appears to be the better measure of the role of capital costs as a factor in desired cash holdings: in contrast to idle cash or short-term securities, the *yield* of long-term securities is significantly affected by the possibility of changes in the capital value of the security, associated with future changes of the interest rate. Thus, insofar as funds can move between the two security markets, the interest yield on short-term securities will tend to move parallel to the *total* yield (interest plus capital gain factor) anticipated on long-term securities. Hence movements in the short-term rate of interest are in this respect more representative of movements in the true yield on long-term securities than the latter's own interest yield.[20] And they will clearly be

[20] An obvious instance of this relationship is provided by the movements of the long-term rate of interest during the thirties. The short-term rate fell precipitately during the early years of the decade, but the long-term rate's decline was slowed by the current opinion that it would not fall any further (and might instead rise) because of the "lowness" of its existing level. Only as the drop of the short-term rate continued and the long-term rate failed to show any signs of rising did investors accept the likelihood that the "equilibrium" value of the long-term rate was moving downward; and only as this readjustment of outlook occurred could the long rate follow after the short rate. Hence, as discussed above, this gradual downward shift probably did not reflect a decline in the (anticipated) total rate of return on long-term capital toward the level of the return on short-term capital. Since the anticipated capital loss component of the return was declining, simultaneous reduction of the interest rate component was necessary.

It is interesting to note that if a declining trend is eliminated from the long-term interest rate series for the period 1934–40, the adjusted series conforms very well with the short-term interest rate series and the velocity series. (The correspondence found is even more striking when a 3–5 year government security interest rate is adjusted for trend.)

more representative of yields in general than will the long-term interest yield. For these reasons the interest rate on short-term securities has been selected.[21]

In Chart 7 the rate on short-term government securities has therefore been plotted in scatter diagram form against the desired money supply. The desired money supply figures are derived by multiplication of the actual ratios of money supply to GNP (the reciprocals of the series in Chart 6) by the 1953 GNP, so that the whole presentation of money supply against the interest rate is made in terms of an income level equal to that of 1953.[22]

The scatter of points in Chart 7 reveals two separate interest-demand curves for money: a curvilinear relationship for the interwar period having relatively low elasticity for very low interest rates, and a linear postwar relationship showing both a higher elasticity of demand and a higher level of demand for money.[23]

The postwar relationship is very convincing, its only weakness being the absence of a reversal in the direction of both series over time. This deficiency is partly compensated, however, by the presence of two pairs of successive observations (1948–49 and 1951–52) of almost no change in the interest rate, both of which were accompanied by stability of the money supply–GNP ratio.

[21] A money demand relationship has been derived with the use of the long-term business bond yield (H. A. Lantane, "Cash Balances and the Interest Rate—A Pragmatic Approach," *Review of Economics and Statistics*, November 1954, pp. 456–61). A high correlation is found, although in terms of year-to-year movements the relationship is inferior to the one here developed.

[22] A slightly different method of determining desired cash balances has been proposed (J. Tobin, "Liquidity Preference and Monetary Policy," *Review of Economics and Statistics*, February 1947, pp. 124–32, and November 1948, p. 316). This method distinguished two components of the demand for money: *transactions* (active) balances (needed for turning over the GNP) which are proportional to GNP and independent of the interest rate, and *speculative* (idle) balances which are independent of the level of income and are a function of the interest rate (and possibly of the value of total wealth).

This method differs from the one used above, which assumes that transactions and speculative balances are each functions of both the interest rate and the level of income. The alternative method has merit, but it is probably extreme in assuming that the volume of idle money desired is determined only by the interest rate and is not affected by the level of current income; the willingness to hold idle balances, thereby surrendering current income (in the hope of future capital gains or avoidance of future capital losses or merely to avoid the inconvenience of making investments), is closely related to the willingness to make savings; idle balance holdings should therefore vary with the current income level.

[23] Because of the extreme lowness of interest rates in the thirties, the magnitude of the actual percentage variations would have been concealed by an arithmetic scale. Therefore the interest rate is shown in Chart 7 on a logarithmic scale.

For reasons presented above, the data for years of abnormal conditions—the years immediately following World War I, the years of U.S. participation in World War II, and the early thirties—have been disregarded in the fitting of these curves.

The curve fitted to the prewar dates is somewhat less satisfactory, for it has been fitted to two widely separated clusters of observations: 1922–30, all of which show interest rates over 2.4 per cent, and 1933–42, for all of which the rate was 0.5 per cent or less. In actuality, therefore, there may have been two separate interest-demand relationships in the interwar period: one for the twenties (which is rather like the postwar relationship) and a much less elastic one for the thirties. Of course, the fact that the demand curve for money may shift over time is no limitation of the validity of the theoretical relationships between the direction of money supply and income changes found in this paper. All that is necessary for the purposes of this study is the existence of some relationship between the interest rate and the desired money supply.[24]

Elasticity of Banks' Supply of Money

The analysis of the banks' supply elasticity of money runs along the same general lines as that of the public's demand for money. It has been shown that the public changes its cash reserve ratio (which is the inverse of the velocity of circulation of money) in the light of the rate of interest. It is plausible to assume that banks operate in a similar manner. Like the public they will want to balance the convenience of a high reserve ratio against a low rate of interest, the inconvenience and risk of a lower ratio against a higher rate of interest.

The larger part of the reserves of the banking system is fixed by the prescribed reserve ratios of the Federal Reserve System. The "free" part of reserves that would be relevant in a comparison with interest rates would, therefore, be reserves held in excess of legal requirements.

But these excess reserves will have been created to some degree out of funds borrowed from the Federal Reserve System by particular banks which would otherwise have inadequate reserves. Since indebtedness to the Federal Reserve System is considered undesirable, reserve balances

[24] It might be argued that the observed relationship represents only the coincidence of two factors: improving economic conditions cause (1) use of entrepreneurs' idle balances, thus causing velocity to rise, and (2) rising demand for credit producing rising interest rates. But even if such covariation (rather than correlation) is the actual relationship, it is sufficient for the purposes of this study, which requires only that given rises in interest rates accompany known amounts of economization of cash balances, etc. In any case, the fact that in 1927 (and even in 1924) velocity behaved in the expected manner when interest rates were changed independently of internal economic developments is evidence that the observed relationship is more than mere covariation. (Interest rates were reduced despite stable economic conditions because of an inflow of foreign capital and because of the authorities' desire to assist European countries in their efforts to restore and maintain the gold standard in the face of capital movements to the United States; the inflow was itself responsible for some reduction in rates since it increased bank reserves, and Federal Reserve policy was altered so as to depress rates still further.)

secured through the medium of such debt ought not to be included when excess reserves are being measured. Therefore, "free" reserves which are relevant in a comparison with interest rates should be interpreted as meaning excess reserves minus net borrowings from the Federal Reserve System.

Deflation of excess reserves by deposit liabilities

The definition of these net excess reserves is made more closely relevant to the interest rate problem by one further modification of the data. Clearly, net excess reserves of, say, $1 billion for all member banks provided a higher degree of liquidity when deposit liabilities were $30 billion (in the thirties) than they did with total deposit liabilities at $144 billion (in 1953). This change in conditions can be allowed for if the need for net excess reserves is taken as proportional to the total of deposit liabilities—a procedure justified logically by the fact that reserves are desired as a cushion between variations in actual reserves relative to required reserves. Other things equal, these variations are proportional to the volume of deposit liabilities; larger deposits imply larger volumes of transactions by depositors and therefore greater (absolute) changes in the banks' reserve positions, with the consequence of larger lines of credit from the Federal Reserve System and larger needs for excess reserves. In the following analysis of the banks' supply of money, therefore, the relationship between the rate of interest and banks' excess reserves has been derived from the observed data, with actual net excess reserves (total excess reserves of member banks less borrowings from the Federal Reserve System) expressed as a ratio to the existing total deposit liabilities.[25]

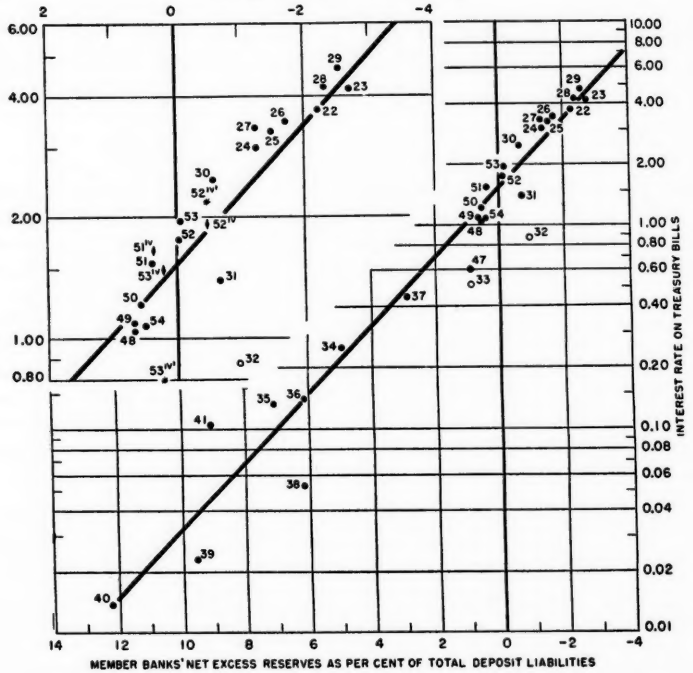
[25] It seems unnecessary to make a further adjustment for the height of the legal reserve ratio on the ground that excess reserves are held, in large part, to meet potential needs for legally required reserves. The higher the reserve ratio, the smaller is the reduction in a bank's assets made necessary by any withdrawal of deposits: reserves drop by 100 per cent of the deposit withdrawal, but legally required reserves drop by larger fractions of that amount, the larger is the legal reserve requirement, so that the drop in reserves relative to required amounts is smaller as the reserve requirement is larger. More important, the amount of reduction in a bank's earning assets which would be made necessary by a net drop in reserves is obviously smaller as the reserve ratio is higher. Hence, insofar as excess reserves are maintained as a cushion against sudden enforced liquidations of earning assets, the need for them is smaller, the higher is the legal (or conventional) reserve ratio. On the other hand, insofar as excess reserves are maintained by banks in anticipation of advantageous possibilities for expansion of earning assets, the higher reserve requirement makes necessary larger excess reserve holdings. The net effect from these counteracting factors probably favors smaller excess reserves for higher reserve requirements (since enforced curtailment of loans, etc., is probably more feared than loss of opportunities for particularly advantageous loan expansions), but the net balance between the two effects is unknown and probably small.

Observed interest-reserves relationship

In Chart 8 the data for the ratios of member banks' net excess reserves to deposit liabilities are plotted in scatter diagram form against the short-term government security rate (yield of Treasury bills). By use of

CHART 8. RELATION BETWEEN BANKS' NET EXCESS RESERVES AS PERCENTAGE OF DEPOSIT LIABILITIES AND INTEREST RATES IN THE UNITED STATES, 1922–53[1]

(Logarithmic verticle scale)



[1] Reserves data are averages of daily figures; annual deposits are June 30 data; 1947 reserves include some Treasury bill holdings which were freely convertible into reserves without cost.

a logarithmic scale for interest rates, the chart makes possible observation of the effect on excess reserves during the thirties when the rate varied between the very low levels of 0.01 per cent and 0.5 per cent, and it is found that a good linear relationship can be fitted to the entire range

of points over the period 1920–53.[26] (As in the case of demand for money discussed above, the years 1920, 1921, 1931–33, and 1942–46 were disregarded in the fitting of this relationship.)

Reliability of observed interest-reserves relationship

The reliability of the relationship fitted might be questioned because the data used cover more than 30 years—a period during which financial institutions and financial practices would be expected to change. The fit of the curve may be poor, it is true, at its lower end, e.g., for interest rates below 0.12 per cent, but such extremely low rates are not likely to recur, and the unreliability of the relationship in this region is therefore not a serious matter. In the higher ranges of the curve, the experience of the late forties and early fifties tends to corroborate that of the twenties; although interest rates had remained well below the levels of the twenties for a period of 20 to 30 years, when they returned to nearly these levels the movement traced out almost exactly the preexisting reserve-interest relationship.[27]

The corroboration of the relationship of the twenties by recent annual data is reinforced by a study of quarterly data for the two years showing the highest interest rates in the period following World War II. Chart 9 shows quarterly movements in net excess reserves, the Treasury bill rate, banks' customers' loan rate, the commercial paper rate, and the 3–5 year government bond yield. Net excess reserves, which were approximately constant during 1951, declined continuously during 1952, then rose continuously through the first quarter of 1954. The interest rates moved as expected, rising in 1952 and falling in 1953. The peak in interest rates was, however, lagged behind the minimum excess reserves, for the highest rates were reached only in the second quarter of 1953. Thus in relating interest rates of this period to net excess reserves on a

[26] This chart is similar to one in Tinbergen, *op. cit.*, p. 85, which compared the interest rate and absolute amounts of net excess reserves in the twenties and part of the thirties. That study indicated practically infinite elasticity of demand for excess reserves at the low interest rate levels of the middle thirties. This finding would not have been made, however, if the interest rate had been plotted on a logarithmic scale, as in Chart 8.

[27] No appreciable noncomparability results from the fact that Treasury bill interest was taxable in the period following World War II but nontaxable in the twenties; tax rates were very low in the latter period so that the tax exemption feature had little influence on the level of bill yields.

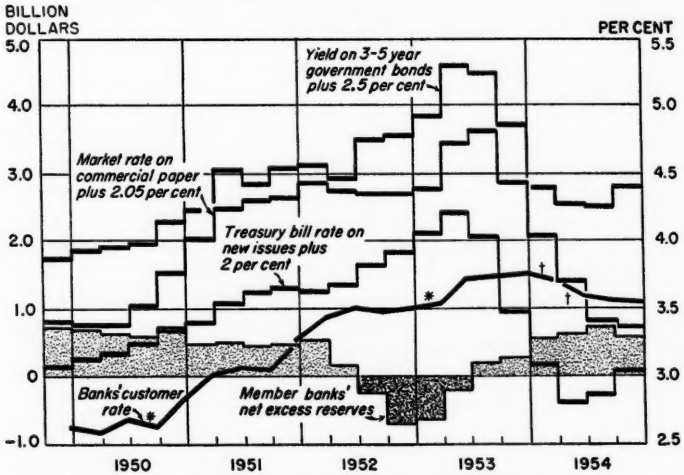
The taxable bill rate for 1941, however, does require lowering if it is to be compared with the nontaxable bill rate of the thirties, for taxes were fairly high in 1941.

Note, however, that the (near) homogeneity of the Treasury bill rate series does not prevent variation in the cost (in terms of foregone interest) of holding idle money which results, even under constant interest rates, from variations in the level of income taxes.

quarterly basis it is necessary to lag the rate two quarters behind the net reserve position.[28]

When the reserves for the fourth quarter of 1952 (deflated by deposit

CHART 9. BANKS' NET EXCESS RESERVES AND INTEREST RATES IN THE UNITED STATES, FOURTH QUARTER, 1949-FOURTH QUARTER, 1954



* Federal Reserve discount rate raised one fourth of 1 per cent.
† Federal Reserve discount rate reduced one fourth of 1 per cent.

liabilities) are thus plotted against the interest rate for the second quarter of 1953 (1952-iv in Chart 8), the interest-reserves relationship

[28] Introduction of this lag does not imply a breakdown in the interest-reserves relationship. Borrowings from the Federal Reserve System are customarily used as a temporary means of postponing liquidation of earning assets when excess reserves have fallen. The borrowings are intended to make possible a temporary reconstitution of (gross) excess reserves to permit the pre-existing volume of assets to be reduced gradually so that capital losses may be avoided and commercial customer relations need not be disturbed.

This is what happened in 1952 and 1953; excess reserves gross of borrowings were held fairly stable during 1952, borrowing being relied on to make possible retention (and even expansion) of earning assets. But beginning with the end of 1952, government securities were gradually liquidated so that total assets fell (with part of the resulting additions to excess reserves being used for retiring Federal Reserve loans). And since rises in interest rates accompanied the asset liquidation of this period, rising rates coincided, temporarily, with rising net excess reserves.

The existence of as long a lag as six months in the appearance of the excess reserves-deposits relationship would make findings like those of Table 2 unreliable when the critical time periods discovered were under one year. However, the existence of such a lag need not be the rule. Monthly data presented by Tinbergen (*op. cit.*, p. 85) show that during all of the twenties the lag was very short.

at the time when the postwar interest rate was highest is found to be very close to the relationship in prewar years, and even closer than the relationship indicated by postwar annual data. This point is perhaps particularly significant because it carries the postwar series of interest rate observations closer to the series of the twenties than any other recent observation, strengthening the case for the continuing validity of the prewar relationship.[29]

Supply curve of money derived from banks' interest-reserves relationship

The regression line based on this scatter of interest-reserve points indicates that a given proportional change in the short-term interest rate tends to affect the desired net excess reserves/deposit liabilities ratio by the same absolute amount, whatever the value of the initial interest rate.

From this relationship it is easy to derive the effect of any change in the interest rate on the banks' supply of deposits and—assuming that currency in circulation varies proportionally with deposits—on the total money supply.[30]

The banking supply curve for the money supply derived in this manner and defined (with respect to banks' legal reserve requirements, total and component deposit liabilities, currency in circulation, etc.) in terms of the situation of 1953 has already been shown above (Chart 7) super-

[29] The rising rate-falling reserves observation of 1951–53 may be part of a complete cycle, since reserves rose and interest rates fell in 1953. The end of the cycle may be represented either by 1953-iii reserves with interest rates lagged to 1954-ii, or by the unlagged data of 1954-i or 1954-ii. In either case, the interest rate is much lower than what the actual level of reserves and the assumed interest-reserves relationship would justify. Special factors—in particular a strong expectation that banks' excess reserves would be shortly increased via a reduction in legally required reserves (an antideflationary measure)—have been offered in banking circles as responsible for this situation.

[30] Several additional simplifying assumptions are made: any changes in deposits associated with the fairly short-run changes in income or balance of payments under investigation in this paper affect demand deposits only; within the banking system, they affect only deposits of member banks of the Federal Reserve System. The latter assumption is necessary because of the variability of the reserve requirements of nonmember banks. (It should not be a very damaging assumption, however, because only 13 per cent of demand deposits are found outside of member banks.) A similar problem arises over the distribution of changes in deposits among the three classes of member banks which have differing legal reserve requirements and somewhat different interest-desired excess reserve relationships (Chart 8 being only the observed composite relationship). It is necessary to assume that the distribution of such changes conforms to a reasonably stable pattern. Banks' holdings of currency ("vault cash") were taken to be a constant ratio to deposit liabilities—as was demonstrated by the data. Finally, those liquid "reserve" holdings in the form of deposits with other banks were ignored. This is justified for the reasons (1) that the adjustments of this form of liquidity to the interest rate have been more or less in step with the adjustments of net excess reserves, and (2) interbank deposits have, in effect, zero legal reserve requirements and hence do not absorb much loan-making capacity.

imposed on the demand curves derived in the previous section. This supply curve is found to have a fairly constant elasticity (between .07 and .08) with respect to the interest rate.

Ratio of public's interest elasticity of demand for money to banks' interest elasticity of supply of money

With the evidence of the demand and supply elasticities for money derived for the United States in the two preceding sections, it is now possible to confront the critical value for the ratio of the two elasticities derived in Table 1 above with an empirically determined figure.

The ratios of the demand to the supply elasticities of the curves plotted in Chart 7 above vary between 2½ and 5 when the postwar demand relationship is used and between 1 and 2 when the prewar demand relationship is used, with higher interest rates in the latter case and lower rates in the former case showing higher values for the ratio.[31]

If the postwar relationship is accepted as valid for the future, it is found that even in the United States changes in income might be expected to result after one year in changes in the money supply of opposite sign: the actual ratios of the elasticities fall between 2½ and 5 and include the critical value of 4.2 found for the United States in Table 1. This would not, however, be true on the basis of the prewar demand elasticity.

It is, of course, not possible to apply to other countries the ratios of elasticities found for the United States. Both demand and supply elasticities must vary from country to country and their ratio may vary even more. If it is possible at least to assume that the minimum value for the ratio in most countries will be no less than one fourth of the postwar U.S. ratio (i.e., approximately over unity), then it can be concluded that more than half of the countries recorded in Table 1 should experience opposite changes in money supply and income in a year or less, for 27 of the 38 countries covered have critical values for the elasticities ratio of unity or less. Fifteen countries—including the Netherlands, all Scandinavia, the United Kingdom, and three of the four developed Commonwealth countries—could, in circumstances where the original assumptions about central bank neutrality, etc., are appropriate, show opposite changes in money supply and income in a year or less at a ratio of the elasticities as low as one eighth of that of the United States.

Whether the U.S. ratios can be extrapolated to other countries in even so conservative a way as has just been done remains an open question.

[31] The prewar elasticity ratio falls below unity for interest rates below 0.3 per cent, dropping to a minimum of 0.5 at an interest rate of about 0.02 per cent. These interest rates are abnormally low, however, and the low ratios associated with them can probably be ignored.

However, the data for the United States provide at least a demonstration of the fact that the ratio of the elasticities can be quite high and that it is therefore plausible to suppose that opposite changes in money supply and in income may occur in many countries.

Appendix

I. The General System—No Central Bank Financing

The analysis postulates an initial situation in which there is balance between the money supply and national income at given rates of interest, and foreign trade is in balance, exports equaling imports and reserves remaining unchanged. All variables are measured as deviations from this equilibrium situation.

We then use the simplest assumptions possible. The demand for money (MO) depends on national income (Y) and the rate of interest (r):

$$MO = \alpha Y - \beta r \tag{1.1}$$

The supply of money by the banking system depends on its reserves (R) and the rate of interest:

$$MO = \gamma R + \delta r \tag{1.2}$$

Consumption (CO)[32] and imports (M) are related to changes in national income (Y) by the marginal propensities to consume (c) and to import (m):

$$CO = cY \tag{1.3}$$

$$M = mY \tag{1.4}$$

Exports are assumed constant, so that

$$Y = I + CO - M \tag{1.5}$$

Any autonomous I will then lead to a change in income of

$$Y = \frac{I}{1 - c + m} \tag{1.6}$$

and this will lead to a change in commercial banks' reserves equal to the annual increase in imports multiplied by the period t (in years) during which the changed level of Y persists:

$$R = -tM = -tmY \tag{1.7}$$

Hence (1.2) becomes:

$$MO = -t\gamma mY + \delta r \tag{1.8}$$

Equations (1.1) and (1.5) suffice to express both r and MO in terms of Y:

$$r = Y\frac{\alpha + t\gamma m}{\delta + \beta} \tag{1.9}$$

$$MO = Y\frac{\delta\alpha - t\gamma\beta m}{\delta + \beta} \tag{1.10}$$

All coefficients are defined as positive. Hence a change in Y will lead to a change of r in the same direction. But the sign of the effect on MO is not clear. The de-

[32] The symbol, C, used in Section III of the Appendix, stands for currency.

nominator $(\delta + \beta)$ is positive. But the numerator is of uncertain sign. For $t = 0$, it is positive; for sufficiently large values of t, it must become negative.

The number of time units that it will take for MO to return to zero is found from the numerator of (1.7):

$$t = \frac{\alpha}{\gamma m} \cdot \frac{\delta}{\beta} \tag{1.11}$$

For smaller time periods, MO will deviate from its original position in the *same* direction as Y; for longer time periods, the deviations of MO and Y will be in *opposite* directions.

II. Central Bank Financing of Autonomous Investment

Let gI $(0 < g < 1)$ be the amount by which central bank credit is expanded (directly or indirectly) to finance the additional autonomous expenditure, I. As a result, commercial banks' reserves will on this account increase by gI per unit of time. Accordingly, (1.7) becomes

$$R = -tmY + tgI \tag{2.1}$$

or, using (1.6):

$$R = -tmY\left(1 - g\frac{1 - c + m}{m}\right) \tag{2.2}$$

This leads to corresponding changes in (1.9) and (1.10):

$$r = Y\frac{\alpha + t\gamma m\left[1 - g\left(1 + \dfrac{1 - c}{m}\right)\right]}{\delta + \beta} \tag{2.3}$$

$$MO = Y\frac{\delta\alpha - t\gamma\beta m\left[1 - g\left(1 + \dfrac{1 - c}{m}\right)\right]}{\delta + \beta} \tag{2.4}$$

In the special case where the investment is fully financed by the central bank $(g = 1)$, (2.3) simplifies to:

$$\underset{(g = 1)}{r = Y\frac{\alpha - t\gamma(1 - c)}{\delta + \beta}} \tag{2.3^1}$$

This shows that under these assumptions the rate of interest must (provided $c < 1$), with time, fall below the initial rate—an experience not unusual with inflationary government deficit financing.

Under the same assumption $(g = 1)$, the quantity of money must go up for all values of t (provided $c < 1$):

$$\underset{(g = 1)}{MO = Y\frac{\delta\alpha + t\gamma\beta(1 - c)}{\delta + \beta}} \tag{2.4^1}$$

It follows from (2.4) that the condition for a turning point in the quantity of money, i.e., for MO to become negative for large enough values for t, is:

$$g < \frac{m}{1 - c + m} \tag{2.5}$$

This inequality means that the loss in bank reserves (the import surplus) is not fully covered by the central bank.

III. Different Interest Elasticities of Demand for Currency and Deposits

The system becomes somewhat more involved if different interest elasticities of demand are allowed for currency and deposits. It seems most reasonable to develop this case on the extreme, but perhaps not unreasonable, assumption that elasticity of demand for currency equals 0.

We can then write the demand equations for deposits (D) and currency (C):[33]

$$D = \alpha_D Y - \beta_D r \tag{3.1}$$

$$C = \alpha_C Y \tag{3.2}$$

The supply equation for deposits would be:

$$D = \gamma_D R + \delta_D r \tag{3.3}$$

R, the level of reserves of the commercial banks, will be affected in two ways: (1) initially, by the increase in C due to the autonomous rise in Y; and (2) gradually over time by the imports occasioned by the higher level of Y. The process set off by the latter cause is in no way different from that described by the equations in the previous section. Therefore, we can concentrate here on the starting point of the downward process, at time $t = 0$, which will have a lower MO than the starting point in Section I of this Appendix. Thus not only will $MO = 0$ be reached in a shorter time than derived above, but it also does not seem impossible that MO will fall below its previous equilibrium level even at $t = 0$. At that time:

$$R = -C = -\alpha_C Y \tag{3.4}$$

Hence the supply equation for deposits becomes:

$$D = -\alpha_C \gamma_D Y + \delta_D r \tag{3.5}$$

Combining this with (2.1), we find:

$$D = Y\left[\alpha_D - \frac{\beta_D}{\delta_D + \beta_D}(\alpha_D + \alpha_C \gamma_D)\right] \tag{3.6}$$

When (2.6) is combined with (2.2), the total quantity of money at time 0 is found as:

$$MO = D + C = Y\left[(\alpha_D + \alpha_C) - \frac{\beta_D}{\delta_D + \beta_D}(\alpha_D + \alpha_C \gamma_D)\right] \tag{3.7}$$

The sign of this is uncertain. Clearly $(\alpha_D + \alpha_C \gamma_D) > (\alpha_D + \alpha_C)$. But also $\frac{\beta_D}{\delta_D + \beta_D} < 1$. We therefore find that whether the initial money supply (after in-

[33] The subscripts C or D indicate whether the coefficient applies to currency or deposits. The coefficients in this section are related to those in the previous section as follows:

$$\alpha_D + \alpha_C = \alpha$$

$$\beta_D = \beta$$

γ_D and δ_D are larger than γ and δ because the former coefficients are determined only by the expansion in deposits on the basis of reserves, while the latter also make allowance for the corresponding currency drain.

come has increased but before imports have significantly reduced foreign exchange holdings) is greater or smaller than the money supply in the equilibrium situation just preceding will depend on:

(1) The (marginal) ratio of currency to deposits, $\alpha_C \div \alpha_D$
(2) The banks' reserve ratio against deposits, of which γ_D is the reciprocal; and
(3) The ratio of the demand and supply elasticities.

To take an example: For $\alpha_C{:}\alpha_D = 1{:}3$ and $\gamma_D = 4$, the money supply corresponding to an increased income at time zero would be >0 for $\frac{\beta_D}{\delta_D + \beta_D} < \frac{4}{7}$, i.e., for $\frac{\beta_D}{\delta_D} < 1\frac{1}{3}$.

There seems no a priori reason why this condition need be fulfilled; and the paradox may thus be true that an increase in the demand for money would, if the central bank did not compensate at least part of the currency drain, lead at once to a reduction in the quantity of money.

In that case, an increase in income would at once[34] lead to a reduction in the money supply; and it would do this in an open as well as in a closed economy.

IV. The Effect of the Rate of Interest on Income

The dynamic system discussed on pages 408–10 above is constructed from equations (1.1) through (1.5) (with the modification that all variables are "dated" with the subscript t) plus two additional equations:

$$I_t = I_A - \rho r_t \tag{4.1}$$

where I_A is the autonomous change in investment and ρ reflects the responsiveness of investment in general to the interest rate;

$$R_t = R_{t-1} - M_t \tag{4.2}$$

i
s the dynamic factor in the system, the only equation in which a lagged variable appears.

From these equations, first degree difference equations can be derived, showing the movement of the quantity of money, income, and the rate of interest over time.[35] The equation for the quantity of money can be solved to find the value for t at which MO will have returned to its base-period level (zero); see Charts 3 and 5:

$$t = \frac{\log\left[1 - \dfrac{\rho(\alpha\delta - \beta m\gamma)}{[\alpha\rho + \beta(1 - c + m)](\beta + \delta)}\right]}{\log\left[\dfrac{(1 - c + m)(\beta + \delta) + \alpha\rho}{(1 - c + m)(\beta + \delta) + \alpha\rho + m\gamma\rho}\right]} + 1 \tag{4.3}$$

There is an important similarity between (4.3) and (1.11). If $\alpha\delta < \beta m\gamma$, it takes less than one year for MO to go to zero according to both sets of equations; if $\alpha\delta = \beta m\gamma$, it takes exactly one year; and if $\alpha\delta > \beta m\gamma$, it takes more than one year. In other words, if the simpler system which did not take account of the effect of the rate of interest on investment showed a period of less than a year for MO to cut the zero line, then the more elaborate system cannot possibly show a period in excess of one year. It would appear, moreover, that the numerical difference

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[34] Leaving out of account various institutional time lags; e.g., the need for currency may be somewhat lagged behind the need for deposits, as described by R. G. Hawtrey in *The Art of Central Banking* (London and New York, 1933).

[35] These operations were carried out by T. C. Liu with the assistance of H. S. Cheng, both members of the staff of the International Monetary Fund.

TABLE 3. TIME (IN YEARS) REQUIRED FOR OPPOSITE MOVEMENTS IN MONEY AND INCOME

β	δ \ ρ	0[1]	2	5
1	0.5	0.40	0.47	0.48
1	1	0.80	0.84	0.85
0.5	1	1.60	1.41	1.38

[1] From equation (1.11).

between the more elaborate curvilinear solution and the simpler linear situation is quite small for all plausible values of the coefficients. For instance, assuming $\alpha = 0.4$, $\gamma = 2$, $m = 0.25$, $c = 0.85$ (the first three values reflecting intermediate values found in Table 1, the latter a plausible guess for the marginal propensity to consume), we find the alternative values for β, δ, and ρ given in Table 3.[36]

It may be added that the figures in this tabulation (as well as many other alternative calculations) consistently show that the curvilinear result for t of (4.3) is always higher than the straight line result for t of (1.11) when $t < 1$, and lower when $t > 1$; but no mathematical deductive proof has been found to show that this must necessarily be so.

[36] Since (4.3) is of zero degree in the three interest coefficients β, δ, ρ, the absolute value of these coefficients does not affect the results. The use of the numbers 1, 0.5, and 5 (in the last entry) on the first line reflects therefore only an assumption on the relative magnitudes of the coefficients, viz., that the demand for money responds twice as much (in billions of dollars) to a given change in the interest rate as the supply of money, and that the annual rate of investment responds five times as much, again in billions of dollars, to changes in the interest rate, as the demand for money. Since β and δ both relate the quantity of money and the rate of interest, the ratio of the values assumed for these two coefficients represents also the relative elasticity of the demand and the supply of money. But since the annual rate of investment is in the order of half the value of the money supply, the assumption $\beta = 1$, $\rho = 5$ implies roughly that the demand for investment is ten times as interest-elastic as the demand for money.

A Simple Forecasting Model for the U.S. Economy

Ta-Chung Liu*

AN ATTEMPT IS MADE in this paper to construct for the U.S. economy a statistical system for forecasting gross national product, consumption, and private investment (in plant and equipment).[1] The system is based on the pattern of relationships observed for the period 1929–52. It has been found that, in spite of the great changes during these 23 years, the magnitudes of the major economic variables can be foretold with great accuracy throughout the period by one set of equations constructed on the basis of the movements of a few key variables. These key variables are so-called "predetermined variables" (both exogenous variables and the values of endogenous variables during preceding periods), whose magnitudes for a subsequent period either may be known at the time the forecasts are made or can be assumed on the basis of alternative assumptions regarding governmental policies.

By constructing a statistical "exploratory" model of the main economic relationships relating to consumption, investment, disposable income, money supply, and gross national product, it has been found that five predetermined variables, which are set out in detail below, satisfactorily explain the movements of the main economic variables. The values of gross national product (GNP), consumption, and gross private investment in plant and equipment computed from these forecasting equations during the sample period 1929–52, together with the actual values, are shown in Chart 1. The estimated values are, on the whole, quite close to the actual values.

The model is limited to a few variables; however, as is argued in more

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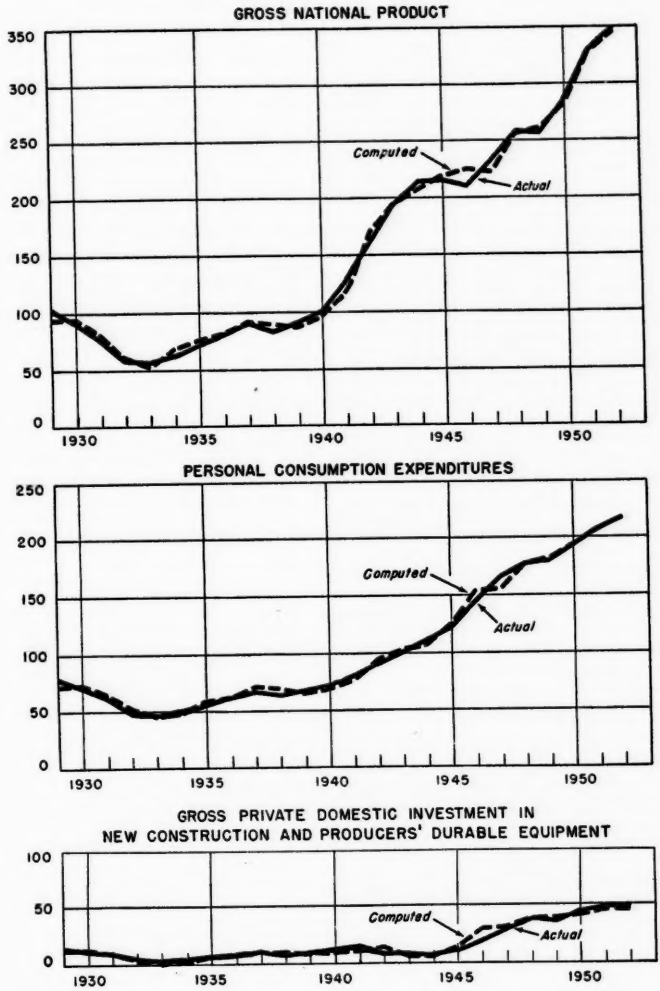
[1] The preparation of this paper was completed in November 1953, before the gross national product and related figures for that year, upon which many of the forecasts in this paper are based, were released by the U.S. Department of Commerce. The figures in Table 2 are therefore forecasts for 1953 obtained from the forecasting equations (9)–(12) on the basis of estimated values of the predetermined variables. The actual values of the predetermined variables became available early in 1954. See Table 2, footnote 1.

CHART 1. U.S. GROSS NATIONAL PRODUCT, CONSUMPTION, AND INVESTMENT: ACTUAL AND COMPUTED VALUES, 1929–52

(In billions of U.S. dollars)



detail in Appendix I, the available data probably do not permit the construction by any method of a model involving more variables. At least for gross product and aggregate consumption and investment, the few predetermined variables included in the model are adequate as a basis for reasonably accurate forecasts.

The 1953 values for GNP, consumption, and investment are predicted under two different assumptions about inventory changes and net foreign investment. While the two assumptions differ substantially, the forecasts based upon them are not far apart (see Table 2).

Forecasts for 1954 required knowledge of the magnitudes of the predetermined variables, which depend mostly on the fiscal plans of the Government. Since fiscal policies for 1954 were far from definite when this paper was written, it appeared most useful to estimate the effects of alternative fiscal policies on the GNP. The results indicate that any given reduction in government purchases of goods and services within a range of up to $20 billion would, if unaccompanied by a reduction in tax rates, bring about a decline in GNP of roughly one and one-half times the amount of the reduction. Therefore, in this case the multiplier of government purchases is about 1.5. If tax rates are cut in such a way that tax revenue falls by an amount equal to the reduction in government purchases, GNP would decline only by an amount equal to about nine tenths of the reduction. The multiplier of an equal reduction in both government purchases and taxes is therefore estimated at about 0.9.[2]

The "Exploratory" Structural Relationships

1. Method to Be Used

The method used in this paper differs from that recommended in the current literature.[3] The latter method centers attention on the measurement of the coefficients in the "structural relationships," explaining the movements of such endogenous variables of the economy as consumption, investment, etc. Statistical estimates found for these structural coefficients are then used to predict the endogenous variables on the basis of particular values assumed for the predetermined variables (such as government expenditure, taxation, etc.).[4]

With rare exceptions, however, no reliable estimates can be made of the coefficients in the structural relationships. Basically, this is due to

[2] The standard errors of the estimated declines in GNP for various reductions in government purchases and taxes range from 10 to 20 per cent of the respective estimates.

[3] For a discussion of the methodological issues, see Appendix III.

[4] The equations used in this method are the solutions for the endogenous variables obtained by solving the structural equations. These equations may be called the "reduced-form solutions of the structural system."

the fact that, in economic reality, there are so many variables which have an important influence on the dependent variable in any structural equation that all structural relationships are likely to be "underidentified."[5] Secondly, even when this lack of identification is somehow overcome, the tendency of many economic variables to follow a similar movement, i.e., to show a high degree of collinearity, makes it quite impossible to say that any estimate of a structural coefficient indicates the influence of one particular economic variable rather than of another.[6] This is so, even when the estimates are made by the recently developed technique of simultaneous estimation and are statistically significant. The weakness of the coefficients found for the structural relationships also affects their reliability and usefulness as elements in forecasting.

The forecasting equations in this paper are obtained by correlating directly by the least squares method the economic variables in whose future values we are interested with the predetermined variables of the system.[7] By this procedure we rely to the utmost on the collinearity of most economic variables in making our forecasts.

Under this method, however, it may still be essential to do some structural estimation, even though only in an "exploratory" sense, in order to determine the predetermined variables to be used in the forecasting scheme. These exploratory structural relationships, admittedly representing oversimplification of economic reality with the endogenous variables limited as far as possible to those for which forecasts are to be made,[8] are useful in revealing the identities of the important predetermined variables. Certain predetermined variables might be brought to our attention only as a result of going through the process of writing out the structural relationships. For instance, it might not be obvious that government transfer payments had to be inserted as a predetermined variable separate from other government expenditures unless the equations for consumption, disposable income, and the definition of the gross national product were written out.[9] More generally, it is only through its bearing

[5] That is, the structural coefficients cannot be uniquely determined from the available data.

[6] For a detailed discussion of this point, see Appendix I.

[7] These forecasting equations may be called "least squares reduced-form equations." It can be shown that the least squares reduced-form equations for an underidentified as well as for an exactly identified system are identical with the maximum likelihood estimates of the reduced-form solutions referred to in footnote 4. In these cases, the so-called a priori restrictions do not constitute any constraint on the likelihood function. In the overidentified cases, however, the least squares reduced-form equations are not identical with the maximum likelihood estimates of the reduced-form solutions under the constraint of the a priori restrictions.

[8] This is for the purpose of limiting the "exploratory" model to a manageable size. As a result, the exploratory structural relationships tend to be overidentified. The "true" structural relationships are likely to be underidentified.

[9] See equations (1), (3), and (5).

on one or more of the structural relationships involved in the problem that we can consider a given predetermined variable as a factor relevant to the problem at hand. The reason is that economic theory deals directly with structural relationships but rarely so with reduced forms. In the forecasting equations which are elaborated below, no predetermined variable will be used unless it has been found to have significant coefficients in the exploratory structural relationships.[10]

For reasons already explained, these exploratory structural relationships are useful only in selecting the predetermined variables, and the estimated structural coefficients found in these equations are not used for forecasting purposes. A way is suggested in Appendix III, however, by which these exploratory equations may be improved so as to throw more light on the structural relationships.

2. A Description of the "Exploratory" Model

The variables used are measured in billions of current U.S. dollars, with the exception of t, which is the ratio of two of the variables expressed as a percentage.

Endogenous variables

GNP: Gross national product
C: Personal consumption expenditures
I: Gross private domestic investment in new construction and producers' durable equipment
Y_d: Disposable personal income
M: Privately held currency outside banks, and bank deposits (including both time and demand deposits but net of interbank deposits)

Predetermined variables

GNP_{-1}: Value of gross national product during the preceding year
K: The sum of change in business inventories, net foreign investment, and government purchases of goods and services[11]
D: National security expenditures (This forms part of K but,

[10] While the estimated structural coefficients do not actually represent the true influences, it is nevertheless true that insignificant structural coefficients or coefficients with inappropriate signs in the structural equations would mean either that the predetermined variable concerned failed to play the theoretical role expected of it, or that it is "inferior" to others in catching the collinearity tendencies.

[11] The first two components of this item do not properly fulfill the requirements of the concept of a predetermined variable. See p. 461.

for reasons to be explained, is also entered as a separate variable.)

P: Government transfer payments (including interest on government securities)

t: The level of tax rates measured in terms of the ratio of total tax revenue (T) to GNP, expressed as a percentage

s: The sum of Federal Reserve holdings of government securities and monetary gold stock

To determine the five endogenous variables, we have four functional relations (the consumption function, the investment function, the disposable income function, and the money supply function) and one identity defining GNP. The functional relationships are estimated on the basis of the data for 1929–51, inclusive, by the Cowles Commission method of simultaneous estimation of the structural coefficients.[12] Two sets of results are given on page 440. The only difference between systems A and B is that the predetermined variable S is included in system B but not in A.[13] These exploratory functions are discussed separately below; certain comments which are relevant to all of them are presented in Appendix I.

Consumption function

It is generally recognized that disposable personal income and cash balances[14] are the two most important explanatory variables of consump-

[12] It is now well known that, for a simultaneous system of economic relationships, the regression coefficients obtained by fitting the equations separately by the least squares procedure do not yield "consistent" estimates of the parameters. The Cowles Commission method is designed to remedy this shortcoming. The technique of estimation is quite simple if the structural equations are exactly identified. All the functional relationships given on page 440, however, are overidentified. These equations are estimated by the single-equation, limited-information, maximum likelihood methods originally worked out by T. W. Anderson and Herman Rubin (see the two articles by these authors, "Estimation of the Parameters of a Single Equation in a Complete System of Stochastic Equations" and "The Asymptotic Properties of Estimates of the Parameters of a Single Equation in a Complete System of Stochastic Equations," *Annals of Mathematical Statistics*, March 1949 and December 1950, respectively). The computation procedure used is the one worked out by Jean Bronfenbronner and Herman Chernoff in "Computational Methods Used in Limited Information Treatment of a Set of Linear Stochastic Difference Equations," Cowles Commission Discussion Papers: Statistics: No. 328. A detailed discussion of this method is also given in L. R. Klein, *A Textbook for Econometrics* (New York, 1953), and William C. Hood and T. C. Koopmans, eds., *Studies in Econometric Method* (New York and London, 1953).

[13] While the S variable is present only in equation (4b), it is in the nature of the Cowles Commission method of simultaneous estimation that all equations in system B are different from those in system A.

[14] As defined above, M is the total privately held cash balance, whereas in a consumption function it is only the part of M held by households that is actually

"EXPLORATORY" MODELS OF STRUCTURAL RELATIONSHIPS[1]

System A	System B
(1a) $C = \underset{(0.087)}{0.640}\ Y_d + \underset{(0.096)}{0.342}\ M - \underset{(0.0004)}{0.0036}\ D^2 + 2.335$	(1b) $C = \underset{(0.066)}{0.716}\ Y_d + \underset{(0.073)}{0.257}\ M - \underset{(0.00031)}{0.00368}\ D^2 + 2.10$
$R = 0.998$	$R = 0.998$
(2a) $I = \underset{(0.038)}{0.161}\ GNP + \underset{(0.038)}{0.031}\ GNP_{-1} - \underset{(0.00022)}{0.0029}\ D^2 - \underset{(0.238)}{0.470}\ t - 1.397$	(2b) $I = \underset{(0.039)}{0.157}\ GNP + \underset{(0.039)}{0.035}\ GNP_{-1} - \underset{(0.0002)}{0.0029}\ D^2 - \underset{(0.242)}{0.456}\ t - 1.576$
$R = 0.990$	$R = 0.990$
(3a) $Y_d = \underset{(0.010)}{0.664}\ (GNP + P) - \underset{(0.212)}{0.699}\ t + 19.038$	(3b) $Y_d = \underset{(0.001)}{0.664}\ (GNP + P) - 0.703\ t + \underset{(0.108)}{19.076}$
$R = 0.999$	$R = 0.999$
(4a) $M = \underset{(0.155)}{0.232}\ GNP + \underset{(0.173)}{0.409}\ GNP_{-1} + 1.493$	(4b) $M = \underset{(0.116)}{0.359}\ GNP + \underset{(0.116)}{0.118}\ GNP_{-1} + \underset{(0.247)}{0.781}\ S + 4.429$
$R = 0.982$	$R = 0.984$

(5) $C + I + K = GNP$

[1] For the method of estimation, see text footnote 12. The figures given in parentheses under the regression coefficients are the respective asymptotical standard errors. The R's represent "correlation coefficients" in the sense that they are the square roots of the portions of the variances of the dependent variables explained by the respective equations. They are, however, different from the usual correlation coefficients which are computed through the least squares method.

A term (usually denoted by u), representing random disturbances, is omitted from all the statistical equations in this paper for the sake of simplicity in presentation.

tion. Consumption is found to be an increasing function of both these variables in equations (1a) and (1b).

During the war years, the increase in consumption did not fully reflect the high levels of disposable income and privately held cash balances. This was due to the efforts to restrain consumption and to free resources for war. Some measurement of the effects of these efforts must be incor-

relevant as an explanatory variable. For forecasting purposes, however, data on the relevant part need to be available on a current basis; this is unfortunately not possible for the relevant part of M. Hence the total of M is used. A study of past data shows that the total and the relevant part moved very closely together.

porated in the equation if the war years are to be included in the same consumption function. It is reasonable to assume that the intensity of the efforts varied in the same direction with D (the magnitude of defense or security expenditure), a predetermined variable. The relationship, however, is unlikely to have been linear. The marginal strain on the economy must have been progressively greater as defense expenditures increased. It is therefore assumed that consumption varied inversely with D^2, with the latter representing a wide variety of considerations, such as wartime rationing, unavailability of goods and services, refraining from buying for patriotic reasons (e.g., increased purchases of savings bonds), and postponing of purchases on account of the inferior quality of wartime goods.[15] It is seen from equations (1a) and (1b) that the regression coefficients of the predetermined variable D^2 are quite significant.

Investment function

A function explaining private gross investment in plant and equipment is included in systems A and B as equations (2a) and (2b). The explanatory variables included are the gross product, the gross product lagged by one year, the square of national defense expenditures (D^2), and an "average rate of taxation" $\left(t = \frac{T}{GNP}\right)$.

Investment in plant and equipment is assumed to be determined first by the magnitude of the gross product, the latter reflecting the demand for the final goods to be produced from the capital assets. Investment plans, however, have to be made long before the physical plant and equipment take shape. While the lags involved may vary in length from a few months to more than a year, it is certain that a part of current investment is actually decided upon the basis of the rates of gross national output at different intervals during the preceding year. Hence GNP_{-1} is introduced as a second explanatory variable. With a role similar to that played by it in the consumption function, the D^2 term is then added to summarize the competitive nature of defense demands, in relation to ordinary uses, for the available resources and the effects of the restrictive measures placed upon private investment on account of defense activities. The predetermined variable D^2 again appeared to be quite significant in equations (2a) and (2b).

[15] It might be thought that a variable such as $\left(\frac{D}{GNP}\right)^2$ would be preferable to D^2, as the proportion of defense output in the total product is a better indication of the strain on the economy than the absolute magnitude of defense expenditures. This, however, would be an unnecessary refinement. Since we have Y_d (disposable income which varied closely with GNP and "acts for" GNP in this connection) in equations (1a) and (1b), and Y_d and D^2 enter into these equations, respectively, positively and negatively, the idea of the ratio is already implied in the equations.

On the assumption that a higher "average rate of taxation" would, other things being equal, have an adverse effect on private investment in plant and equipment, the variable t is introduced as a fourth explanatory variable in equations (2a) and (2b). The concept of an "average rate of taxation" is admittedly unsatisfactory. A larger t may not necessarily indicate increased rates of taxation. It may also, for instance, be the result of upward shifts of income toward the higher brackets, which are subject to progressively higher rates of taxation, even though GNP and the rates remain constant. It has been found, however, that the variable t did indicate quite well changes in the rates of important categories of taxes;[16] t therefore may be used as an approximation to the "average tax rate."

Disposable income function

With the exception of a few items of minor importance, the following is an identity:

$$Y_d = GNP + P - T - (\text{capital consumption allowances} + \text{undistributed corporate profits})$$

On the assumption that the terms in the parentheses in this identity are primarily a function of GNP and of the predetermined variable t, the disposable income functions (3a) and (3b) are merely a linear approximation of this relationship.

Money supply function

The analysis has started with the assumption that the amount of cash balance (currency and bank deposits) held by the private sectors of the economy is determined primarily by their transaction requirements, which may be indicated by the current and the recently past levels of the gross product. To take account of the supply of money, the variable S (the sum of Federal Reserve holdings of government securities and monetary gold stock) is included as a third variable in equation (4b).[17] While

[16] Well-defined relationships have been found to exist between t and (1) personal income tax rates for single persons with net income of $3,000 and no dependents, (2) personal income tax rates for single persons with net income of $10,000, and (3) the ratios of revenue from total corporation income tax (including excess profits tax) to total net income of corporations having a net income, the ratios being roughly adjusted to correct for the changes in the distribution of corporation net income among different income classes.

[17] To include both demand and supply factors in one structural relationship is of course unsatisfactory; the money supply function is therefore more in the nature of an empirical equation than a structural equation. However, no great harm is done, as S is omitted in the subsequent analysis.

the S variable is quite significant in the money supply equation (4b), it will be shown later that the nature of the statistical data is such that it cannot be included in our forecasting equation for GNP. Hence S is dropped as a predetermined variable in system A, and for that system a money supply function is obtained in the form of equation (4a).

Definitional relation of GNP

As given in equation (5), the gross product is by definition equal to the sum of C, I, and K. This relationship is, of course, necessary to make both systems A and B determinate.

The Forecasts

1. The Forecasting Equations

Since the predetermined variables have now been selected, direct least squares regressions on the predetermined variables can also be calculated. These calculations will serve as the forecasting equations for the endogenous variables. The forecasting equations obtained for GNP are as follows, the sample period being 1929–51, the same as for the exploratory structural model:

System A

$$\underset{}{GNP} = \underset{(0.10)}{0.42GNP_{-1}} - \underset{(0.002)}{0.011D^2} + \underset{(0.28)}{2.22K} + \underset{(1.10)}{4.25P} - \underset{(1.08)}{2.45t} + 46.89$$

$$R = 0.997 \quad (6)$$

System B

$$\underset{}{GNP} = \underset{(0.10)}{0.44GNP_{-1}} - \underset{(0.002)}{0.011D^2} + \underset{(0.29)}{2.28K} + \underset{(1.08)}{4.30P} - \underset{(1.23)}{1.94t} - \underset{(0.35)}{0.29S} + 40.43$$

$$R = 0.997 \quad (7)$$

The negative sign of the coefficient of the variable S in equation (7) is unreasonable; it would mean that, *other things being equal*, an increase in the amount of Federal Reserve holdings of government securities and monetary gold stock would reduce the money value of GNP.[18] Equation (7) must therefore be rejected as a basis for forecasts.

For comparison, the following forecasting equations that would have

[18] The reason for the wrong sign of the S term is, of course, that the nature of the available data is such that the influence of the S variable on GNP cannot be observed (see page 459 and footnote 33).

been obtained by the method currently in use, i.e., by solving the system of structural equations for GNP, are given:

System A

$$GNP = 0.51GNP_{-1} - 0.019D^2 + 3.00K + 1.27P - 2.57t + 40.87 \quad (8)$$

System B

$$GNP = 0.24GNP_{-1} - 0.024D^2 + 3.63K + 1.73P - 3.48t + 0.73S + 67.02 \quad (9)$$

The coefficients in (8) are quite different from those in (6), and those in (9) from those in (7). Apart from theoretical considerations, the figures in Table 1 show that equation (6) provides much closer estimates of the actual observations than either (8) or (9).

TABLE 1. RELIABILITY OF ESTIMATE FOR U.S. GROSS NATIONAL PRODUCT (GNP)

(In billions of U.S. dollars)

	Equation		
	(6)	(8)	(9)
Standard error of estimate, 1929–51	6.6	10.8	18.6
Residuals for 1952	−3.1	−12.2	−12.7

After system A had been selected for the reasons indicated, forecasting equations for GNP, consumption, and investment were recomputed with the 1952 observations included. Equation (10), of course, differs only insignificantly from equation (6).

$$\underset{}{GNP} = \underset{(0.08)}{0.39GNP_{-1}} - \underset{(0.002)}{0.009D^2} + \underset{(0.23)}{2.12K} + \underset{(0.92)}{4.75P} - \underset{(0.93)}{2.65t} + 52.48$$

$$R = 0.998 \qquad \frac{\delta^2}{S^2} = 2.38 \quad (10)$$

$$\underset{}{C} = \underset{(0.05)}{0.32GNP_{-1}} - \underset{(0.001)}{0.005D^2} + \underset{(0.15)}{0.76K} + \underset{(0.59)}{3.63P} - \underset{(0.60)}{1.50t} + 41.24$$

$$R = 0.998 \qquad \frac{\delta^2}{S^2} = 2.28 \quad (11)$$

$$\underset{}{I} = \underset{(0.035)}{0.070GNP_{-1}} - \underset{(0.001)}{0.004D^2} + \underset{(0.10)}{0.36K} + \underset{(0.41)}{1.15P} - \underset{(0.41)}{1.17t} + 11.65$$

$$R = 0.984 \qquad \frac{\delta^2}{S^2} = 1.91 \quad (12)$$

All the regression coefficients appear to be quite significant, and the residuals quite random.[19] The values computed from the equations are compared with the actual values in Charts 2, 3, and 4; also, the relative importance of the different predetermined variables is indicated. Our method may now be applied to a number of particular forecasts.

2. Forecasts for the 1953 Values of GNP, Consumption, and Investment

A forecast of the value of GNP for 1953 as a whole can be made by substituting in equation (10) the proper magnitudes of the predetermined variables (Table 2). GNP_{-1} is, of course, given at the 1952 level of $348.0 billion. Estimated values of the other predetermined variables are given in Table 3. Data for the first half year are computed from the official figures. For the second half year, the figures for government purchases (including security purchases) are given at the levels indicated as the most probable at the end of 1953 under current legislation and commitments. The figures given for the sum of the changes in business inventories and net foreign investment for the second half year are based on two alternative assumptions: (a) that it was equal to the sum for the first half of 1953, (b) that it was zero. P and t are assumed to be the same for the second half year as for the first half year.

3. Effects of Fiscal Changes on GNP

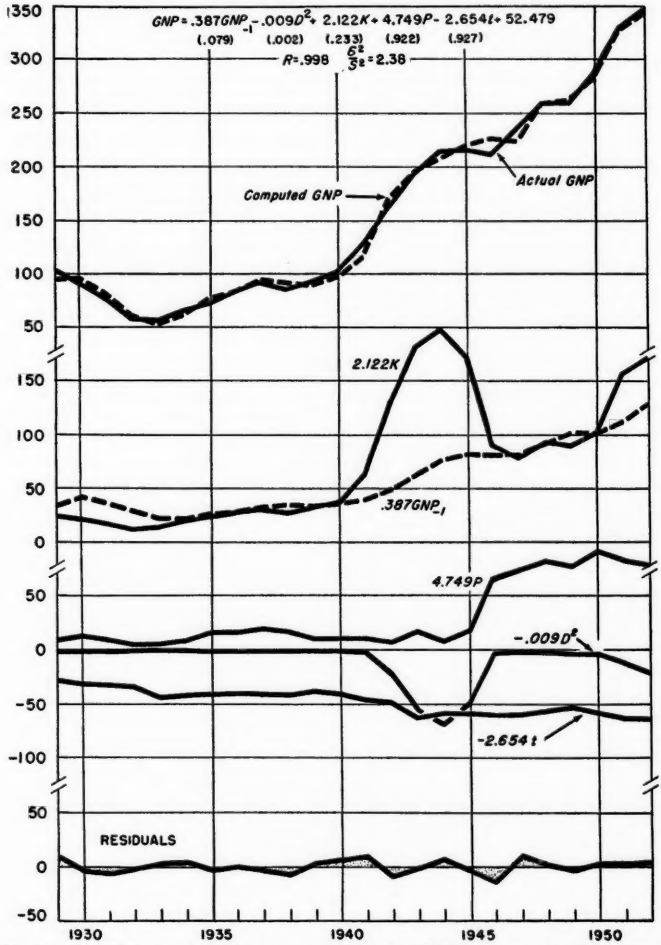
The preceding forecasts for 1953 cannot now be regarded as having any practical value. A much more interesting prediction would be of the value of GNP in 1954. For this purpose, it is again necessary to know the proper magnitudes of the predetermined variables to be used in equation (10). The forecasts given above for the 1953 value of GNP may perhaps be used for the GNP_{-1} term in the equation. As long as the fiscal and budgetary policies of the Government for the calendar year 1954 had not been definitely determined, magnitudes for the other predetermined variables could not be assumed with any degree of assurance. At the time of writing this paper, it seemed clear, however, that there would be some reductions in government expenditures and in tax rates. Some conjectures on the probable effects of such reductions on the level of GNP were of interest. Such forecasts could also be made on the basis of equation (10). Several points, however, which are related to the use of the different terms in equation (10) for these forecasts, should be discussed first.

(A) In analyzing the effect of changes in government purchases and in tax rates, attention will be focussed on the D^2, K, and t terms in equation

[19] As indicated by the ratios of the mean square successive difference to the variance $\frac{\delta^2}{S^2}$, given under the equations.

CHART 2. FORECASTING EQUATION FOR U.S. GROSS NATIONAL PRODUCT: ACTUAL AND COMPUTED VALUES, 1929–52

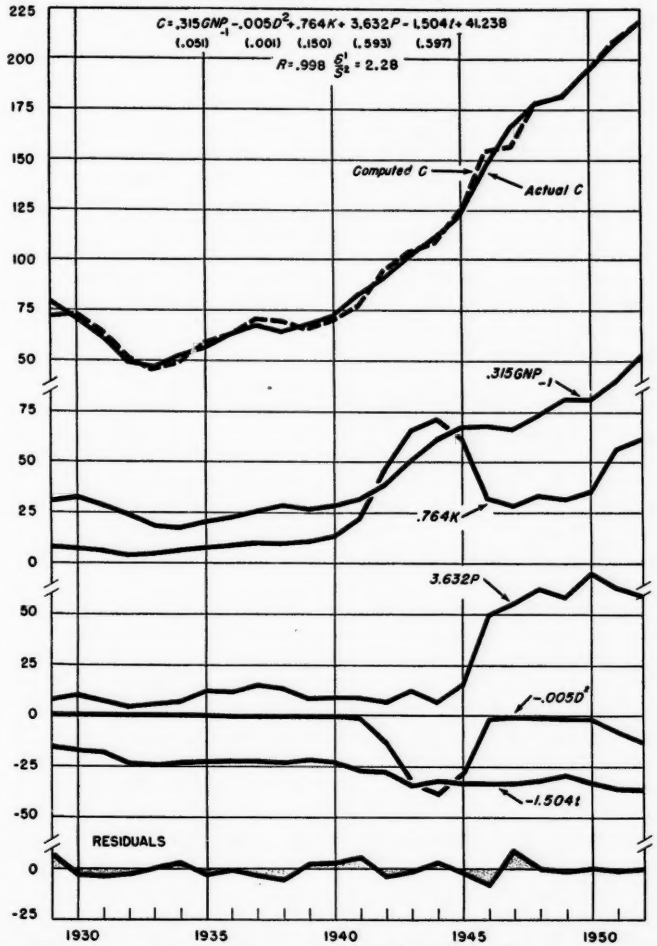
(In billions of U.S. dollars)



(10). It should be noted, however, that the GNP_{-1} term in the equation has a positive coefficient of 0.39. Since GNP was in all likelihood considerably higher in 1953 than in 1952, GNP in 1954 will be greater than in 1953 if there is no change in the other terms. This increase would,

CHART 3. FORECASTING EQUATION FOR U.S. CONSUMPTION: ACTUAL AND COMPUTED VALUES, 1929–52

(In billions of U.S. dollars)

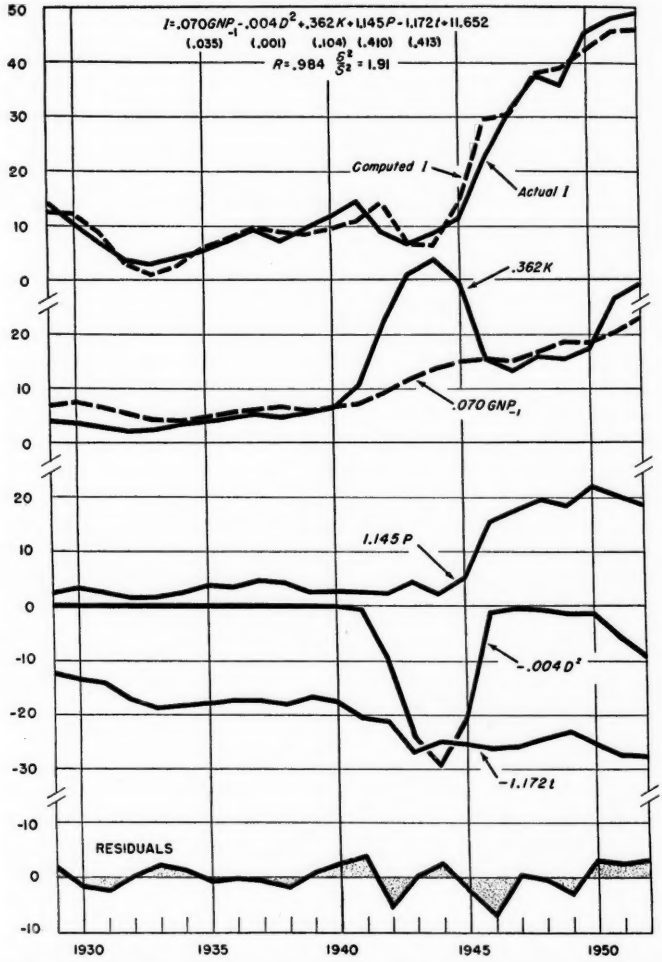


according to equation (10), amount to $8.0 billion for assumption (a) or $6.6 billion for assumption (b).[20] This "growth" factor will not be included in the following discussion of fiscal effects.

[20] (368.6 − 348.0) 0.39 = 8.0. (364.8 − 348.0) 0.39 = 6.6. See Table 2.

CHART 4. FORECASTING EQUATION FOR U.S. INVESTMENT: ACTUAL AND COMPUTED VALUES, 1929–52

(In billions of U.S. dollars)



(B) It is observed in equation (10) that government purchases of goods and services for national security purposes enter into the equation through both the K and the D^2 terms, whereas government purchases for

other purposes affect equation (10) only through the K term. The effect of a change in government purchases on GNP would, according to the equation, be different depending upon whether the cut is in security purchases or in other purchases. There are probably considerable differences between the content of national security purchases and of other government purchases; hence the multiplier effects of these two types of purchases need not be the same. Equation (10), however, is not in fact intended to provide estimates for these possibly different components of the multiplier of government purchases. It is recalled that the D^2 term was introduced to indicate the degree of stress and strain placed on the economy by the heavy increases in security purchases during World War

TABLE 2. ACTUAL VALUES FOR 1952 AND FORECASTS FOR 1953 FOR U.S. GROSS NATIONAL PRODUCT, CONSUMPTION, AND INVESTMENT[1]

(In billions of U.S. dollars)

		1953	
	1952 Actual	Assumption (a)	Assumption (b)
Gross national product	348.0	368.6 ± 3.6	364.8 ± 3.7
Personal consumption expenditure	218.1	232.1 ± 2.3	230.7 ± 2.3
Private domestic gross investment in construction and producers' durable equipment	48.8	49.0 ± 1.6	48.3 ± 1.4

[1] The numbers following the plus and minus signs are the standard errors of the estimates.

The values of GNP, consumption (C), and investment (I) computed from equations (10)–(12), page 444, on the basis of the actual values of the predetermined variables which became available early in 1954, are shown below. These figures are quite close to the actual data; also, they do not diverge greatly from the preliminary calculations analyzed in the text.

The U.S. Department of Commerce subsequently made a thorough revision of the GNP and related data for the whole period 1929–53, the results of which were published in the *Survey of Current Business*, July 1954. Therefore, equations (10)–(12) can no longer be used without recomputation for making forecasts. The effects of the revision upon the application of these equations can be seen by computing the values of GNP, C, and I from equations (10)–(12) on the basis of the revised data for the predetermined variables. The tabulation below also compares these computed figures with the actual (revised) data. The margins of error of these estimates are greater than those obtained on the basis of the data before revision.

Comparison of Actual and Estimated Figures of GNP, C, and I for 1953

(In billions of U.S. dollars)

	Based on data available before July 1954 revision		*Based on revised GNP and related figures in SCB, July 1954*	
	Actual	Estimated from equations (9)–(12)	Actual	Estimated from equations (9)–(12)
GNP	367.2	367.4	364.9	358.7
C	229.8	232.6	230.1	226.3
I	51.8	49.4	49.9	47.6

TABLE 3. VALUES OF PREDETERMINED VARIABLES FOR 1953

(Annual rates, billions of U.S. dollars, except t which is expressed as a percentage)

	First Half Year		Second Half Year (Estimated)		Average (Estimated)
D		51.8		52.8	52.3
Government purchases of goods and services	83.0		84.8		
National security purchases excluding government sales	51.8		52.8		
Other federal purchases	6.3		6.0		
State and local	24.8		26.0		
Sum of change in business inventories and net foreign investment	3.6		3.6[1] 0[2]		
K		86.6		88.4[1] 84.8[2]	87.5[1] 85.7[2]
P		18.1		18.1	18.1
t		24.7		24.7	24.7

[1] Assumption (a).
[2] Assumption (b).

II and, to a smaller extent, during 1950–51.[21] The consequent restraints on the economy reduced the magnitude of the multiplier of government purchases of goods and services during these years. The K and the D^2 terms in equation (10) jointly give effect to this tendency, and provide a basis for estimating the influence on the gross product of a change in government purchases of goods and services as a whole.[22]

[21] There are many conceivable ways of indicating this degree of stress and strain. For instance, an index of the portion of the labor force devoted to national security purposes (including those producing defense supplies) may be used. The variable D would then be replaced by this index in equation (10), and the multiplier obtainable from the equation would be for government purchases as a whole. This example is given to illustrate the nature of the role played by the D variable. It also indicates that D is a very convenient variable to use for this purpose, as other alternatives (such as the index of the portion of labor force devoted to national security purposes discussed above) would be very difficult to construct.

[22] By use of the following formula derived from equation (10) the multiplier for government purchases of goods and services as a whole may be calculated (G

(C) In using the K and D^2 terms to estimate the effect of a reduction in government purchases on the gross product, we need to know the shares of security and nonsecurity purchases in the total contemplated reductions of government purchases.[23] These data would be available for use, if the alternative plans of the Government were given. A study of past data, however, indicates that government purchases have varied throughout the years in accordance with a discernible pattern. This pattern is shown in Chart 5. Before 1941, security purchases were practically zero. Since that year, an increase in total government purchases has always included an increase in security purchases. These two variables have moved up and down together. The pattern, however, is not a rigid one. For instance, on the upward swings of government purchases, the percentage of security purchases in the total has been consistently smaller during the postwar years than it was during the war years 1941–44. Chart 6 shows the scatter relationship between total government purchases and the portion of nonsecurity purchases. While there was a close relationship for the period as a whole, the 1951–53 (first half) line may be accepted as the basis for determining the relative shares in security and nonsecurity purchases, in the belief that the tendency shown during this period is likely to continue in the near future. The equation

---

being the amount of government purchases included in K):

$$\frac{\Delta GNP}{\Delta G} = 2.12 - 0.009 \frac{(D + \Delta D)^2 - D^2}{\Delta G}$$

The magnitude of this multiplier is relatively insensitive to variations in the ratio of security purchases to other purchases. This can best be illustrated with a concrete example. From 1951 to 1952, total government purchases increased by \$14.6 billion. Of this amount, \$11.4 billion (or about 78 per cent) was accounted for by increases in security purchases (from \$37.0 billion in 1951 to \$48.4 billion in 1952). The multiplier of government purchases is

$$\frac{\Delta GNP}{\Delta G} = 2.12 - 0.009 \frac{(48.4^2 - 37.0^2)}{14.6} = 1.52 \qquad (13)$$

If, however, only 60 per cent of the total increase in government purchases had been on account of security purchases, security expenditure would have risen from \$37.0 billion to \$37.0 billion + 0.60 (\$14.6 billion) = \$45.8 billion, with

$$\frac{\Delta GNP}{\Delta G} = 2.12 - 0.009 \frac{(45.8^2 - 37.0^2)}{14.6} = 1.67 \qquad (14)$$

The change in the magnitude of the multiplier, brought about by this change in the ratio of security purchases to government purchases as a whole, is only about 0.15, or 10 per cent of the original magnitude.

[23] It has been shown, however, that the effects calculated from equation (10) are not very sensitive to variations in these shares within reasonable limits. See footnote 22.

CHART 5. U.S. GOVERNMENT PURCHASES OF GOODS AND SERVICES, TOTAL AND NATIONAL SECURITY, 1929–53

(In billions of U.S. dollars)

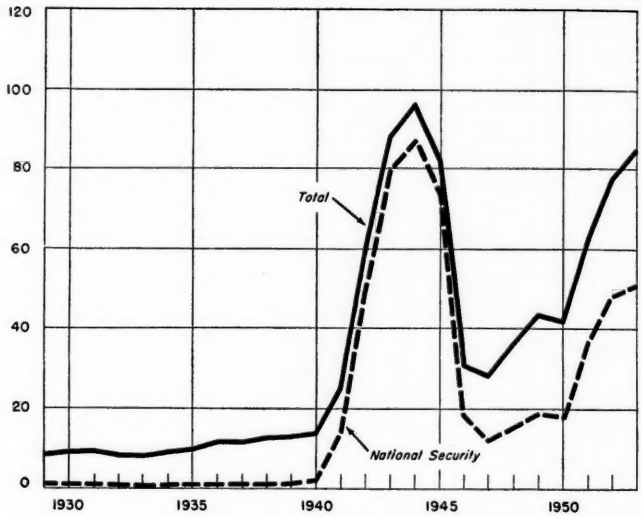
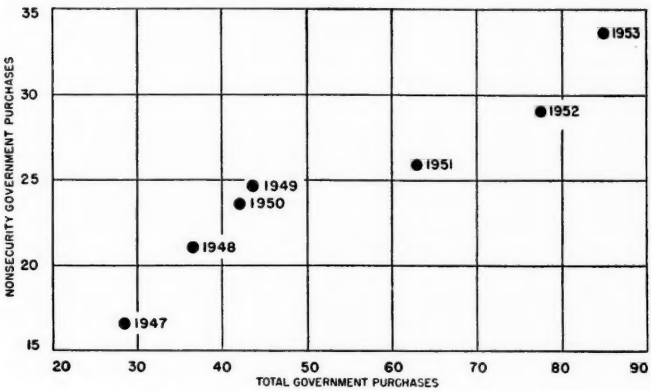


CHART 6. U.S. GOVERNMENT PURCHASES OF GOODS AND SERVICES, TOTAL AND NONSECURITY, 1947–53

(In billions of U.S. dollars)



of the line is:

$$N = 0.255\,G + 9.78 \tag{15}$$

where G and N represent, respectively, total government and nonsecurity purchases of goods and services. Substituting this equation in equation (10) through the relationship $D = G - N$ and writing G in place of K,[24] we secure the following equation representing the effect on GNP, other things being equal, of a change in government purchases from the 1953 (first half) level of $83 billion:

$$\Delta GNP = 2.12\,\Delta G - 0.009\,\{[(0.745)\,(83.0 + \Delta G) - 9.78]^2 - [(0.745)\,(83.0) - 9.78]^2\} \tag{16}$$

From this equation, it is now possible to calculate the probable declines in GNP corresponding to given reductions in government purchases of goods and services from the 1953 (first half) level. These estimates are given in Table 4, the figures given after the plus and minus signs being the respective standard errors of these estimates.

TABLE 4. EFFECTS ON GROSS NATIONAL PRODUCT OF REDUCTIONS IN GOVERNMENT PURCHASES

(In billions of U.S. dollars)

Reductions in Government Purchases of Goods and Services (ΔG)	Resultant Declines in GNP (ΔGNP)	Magnitude of Implied Multiplier ($\Delta GNP/\Delta G$)
1	1.42 ± 0.18	1.42
10	14.68 ± 1.79	1.47
20	30.38 ± 3.59	1.52

Within the range of reduction considered in Table 4, the nonlinear effect on the magnitude of the multiplier is not great. Every reduction of $1 billion in government purchases will bring about a decline of approximately $1.5 billion in GNP.

The next problem is to estimate the effects of a simultaneous reduction in government purchases and taxes on the gross product. For instance, it would be of interest to see how the gross product would change if the reductions of $1 billion, $10 billion, and $20 billion in government purchases discussed above were accompanied by reductions in tax revenues of various amounts.[25]

[24] See the definition of K, p. 438.

[25] It is, of course, also of interest to speculate on the effects of tax reductions alone, without a simultaneous change in government purchases. The standard error of the regression coefficient of the t variable in equation (10) is so large, however, relative to the coefficient itself, that an estimate of the separate effect of

It has been explained that the predetermined variable t, defined as the ratio of total tax revenue to the gross product (T/GNP), represents an average rate of taxation, and that important categories of actual tax rates have shown a general tendency to change with this average rate.[26] It is, in fact, quite necessary from the methodological point of view to use some average of tax rates, instead of tax revenue, as a predetermined variable. Tax revenue is, in all likelihood, a function of both tax rates and many other endogenous variables (such as GNP itself) and is, therefore, an endogenous variable itself. While the Government may be aiming at, say, a reduction of $10 billion in taxes, all that it can do is to reduce certain tax rates; the actual reduction in revenue will probably be different from $10 billion on account of the resultant change in the other endogenous variables (e.g., in the present study, GNP). In order to overcome the same difficulty involved in applying equation (10) to an analysis of the effects of tax reduction, the procedure outlined below will be followed.

First, the magnitude of the variable t corresponding to a desired reduction in revenue is computed on the basis of the existing level of GNP. For instance, for the first half of 1953, GNP is equal to $367.2 billion, and total tax revenue (T) is $90.7 billion. Hence, the average rate of taxation, t, is equal to 24.7 per cent. For this level of GNP, the values of t corresponding to stated declines in revenue are given in Table 5. The

TABLE 5. PRIMARY REDUCTION IN TAX REVENUE AND THE MAGNITUDE OF t

Primary Reductions in Tax Revenue from T = $90.7 Billion (*billion dollars*)	Magnitudes of t for GNP = $367.2 Billion (*per cent*)
1	$(90.7 - 1)/367.2 = 24.4$
5	$(90.7 - 5)/367.2 = 23.3$
10	$(90.7 - 10)/367.2 = 22.0$
15	$(90.7 - 15)/367.2 = 20.6$
20	$(90.7 - 20)/367.2 = 19.3$

reductions in revenue in this tabulation are indicated as "primary reductions" to distinguish them from the final reductions which will ultimately come about as the changes in tax rates (and such changes in government

a reduction in taxes alone cannot be made with any degree of confidence. This standard error is large because of the high degree of collinearity tendency involved in the historical data on taxes and government purchases. In spite of this difficulty, however, the effects of a simultaneous reduction in government purchases and taxes can be estimated with reasonable accuracy, because the covariances between D^2, K, and t coefficients are all negative. This is the reason why the standard errors of the estimated effects of simultaneous reductions in taxes and government purchases (given in Table 6) are relatively small.

[26] See page 442.

expenditure as may be introduced at the same time) work themselves out in a changed value of GNP.

These alternative tax rates are then used, together with the figures for D^2 and K, in equation (10), to estimate the resulting change in GNP. The final losses in taxes can then be computed from the resultant figures for GNP, on the basis of the magnitude for t that is used.

Various alternative estimates of the effects of a simultaneous reduction in government purchases and taxes on GNP are given in Table 6, together with the standard errors of estimates.

TABLE 6. EFFECTS OF REDUCTIONS IN GOVERNMENT PURCHASES AND TAXES ON GROSS NATIONAL PRODUCT

Reduction in Government Purchases ΔG	Primary Reduction in Tax Revenue $\Delta T'$	Resultant Reduction in GNP ΔGNP	Final Losses of Tax Revenue ΔT
1	0.5	1.05 ± 0.11	0.8
	1	0.7 ± 0.15	1.2
10	1	14.0 ± 1.6	4.4
	5	11.0 ± 1.1	7.7
	10	7.5 ± 1.5	11.6
20	1	29.7 ± 3.4	8.2
	5	26.7 ± 2.7	11.4
	10	23.2 ± 2.2	15.0
	15	19.5 ± 2.4	19.1
	20	16.0 ± 3.1	22.9

When the reduction in government purchases is accompanied by an equal amount of primary reduction in tax revenue, GNP is seen to decline by about 0.7 to 0.8 times the decline in government purchases. In these cases, however, the final decline in tax receipts is about 15 to 20 per cent higher than the primary decline. If tax rates are cut in such a way that final tax revenue falls by an amount equal to the reduction in government purchases, the decline in GNP and the implied multiplier would be as indicated in Table 7 (interpolated from Table 6). It is shown in Table 7 that the implied multipliers are close to unity, as might be expected on theoretical grounds.[27]

[27] See the following papers: T. Haavelmo, "Multiplier Effects of a Balanced Budget," *Econometrica*, Vol. 13 (1945), pp. 311–18; G. Haberler, "Multiplier Effects of a Balanced Budget: Some Monetary Implications of Mr. Haavelmo's Paper," *Econometrica*, Vol. 14 (1946), pp. 148–49; R. M. Goodwin, "Multiplier Effects of a Balanced Budget: The Implication of a Lag for Mr. Haavelmo's Analysis," *Econometrica*, Vol. 14 (1946), pp. 150–51; Everette E. Hagen, "Multiplier Effects of a Balanced Budget: Further Analysis," *Econometrica*, Vol. 14 (1946), pp. 152–55; T. Haavelmo, "Multiplier Effects of a Balanced Budget: Reply," *Econometrica*, Vol. 14 (1946), pp. 156–58.

TABLE 7. MULTIPLIER OF AN EQUAL REDUCTION IN GOVERNMENT PURCHASES AND TAX REVENUE

ΔG = Final Reduction in Tax Revenue	ΔGNP	Implied Multiplier
1	0.86	0.86
10	8.90	0.89
20	9.40	0.94

As shown in Table 4, a reduction in government purchases that is not accompanied by any change in tax rates would reduce GNP by about 1.5 times the amount of the reduction in purchases. Table 6 shows that GNP changes by intermediate amounts if taxes are reduced by less than the cut in government expenditure.

It will be recalled, however, that the declines in GNP expected from possible reductions in government purchases in 1954 would at least in part be counteracted by the "growth" trend, discussed earlier, implied in the GNP_{-1} term in equation (10).

Appendix

I. A Discussion of Certain Aspects of the Model

Following upon the consideration which has been given to the individual equations in the exploratory structural and forecasting models, there are also certain aspects of the system as a whole, and certain criticisms which might be made against it, that require further attention. Most of these comments are also applicable to other statistical studies of a similar type.

High correlations and collinearity: their bearing on structural estimation and forecasting scheme

One criticism that is likely to come immediately to the mind of a reader is that the correlation coefficients of the equations in the model are "too high." With the exception of equations (4a), (4b), and (12), none of the structural or forecasting equations has a correlation coefficient lower than 0.99, and even the exceptions have correlation coefficients higher than 0.98. One may legitimately ask whether there can be such regularity in the economic system that three, four, or five explanatory variables would explain more than 98 per cent of the variations[28] in a given variable. Should not such excessively high correlations be a cause for doubt and reservation rather than a source of satisfaction?

It is impossible for any one—and particularly for the social scientist who is constantly harassed by, and hardly can be unaware of, the extreme complexity of the problems he has to deal with—to say that any human behavior can be so simply and completely explained. It cannot literally be true, for instance, that consumption expenditures are almost completely determined by, and only by, the level of disposable income, the amount of cash holdings, and the restrictive influences of defense expenditures, which is what equations (1a) and (1b) in effect purport to say.

[28] As measured by the part of the "variance" of the variable in question explained by the equation. This is equal to the square of the correlation coefficients: $(0.99)^2 = 0.98$.

It is nevertheless true that such a high correlation has in fact been obtained in all the equations presented in this paper and in many other published and unpublished works. The chances are very small that the high correlations obtained are merely the results of sheer accident. An explanation must be sought for the seemingly contradictory positions: On the one hand, it is impossible to believe that the changes in the magnitude of any given economic variable can be explained almost completely by those of only a few other variables; on the other hand, extremely high correlations have been obtained in all the equations here and elsewhere, which cannot be attributed to chance alone.

The answer lies in the collinearity tendencies, briefly discussed in the early part of this paper, of many economic variables to move more or less together. For instance, there must be scores, or even hundreds, of variables that have a bearing on consumption expenditures; but they tend to move in a certain manner with disposable income, or cash holdings, or defense expenditures, or some combinations of these variables, so that their influences have been attributed to the three variables through the mechanism of statistical calculation. As a result, the three variables successfully explained practically all the variations in consumption. Those who are not familiar with the numerical relationship between the magnitude of the correlation coefficient and the actual sizes of some of the residuals may, indeed, challenge this explanation by saying that even this universal collinearity among economic variables could not account for correlation coefficients as high as 0.99. Some of the variables must, at times, have got out of step with the rest, and produced substantial effects on, for instance, consumption, which could not be attributed to the three explanatory variables included in equations (1a) and (1b). Furthermore, what about the purely random factors which may "shock" the economic system accidentally, but nevertheless quite strongly, at times? Can all of these be reasonably accounted for in the 2 per cent variation left unexplained if the R^2 is as high as 0.98?

The answer is in the affirmative, and can best be explained through an example. The R^2 of the reduced-form forecasting equation (10) for GNP is as high as $(0.998)^2 = 0.996$. Yet the residuals (actual values minus computed values) obtained from the equation for some of the years are quite high. Out of a total of 23 years in one period, the residuals for 9 years are greater than 5 per cent of the actual value, the highest being 8.6 per cent in 1929 (Table 8).

TABLE 8. VALUES OF GROSS NATIONAL PRODUCT

(In billions of U.S. dollars, except for last column)

Year	Actual	Computed from Equation (10)	Residual (actual minus computed)	Residual/Actual (*per cent*)
1929	103.8	94.9	8.9	8.6
1931	75.9	81.6	−5.7	7.5
1933	55.8	52.7	3.1	5.6
1934	64.9	60.8	4.1	6.3
1938	84.7	91.5	−6.8	8.0
1940	101.4	96.2	5.2	5.1
1941	126.4	116.7	9.7	7.7
1942	161.6	170.3	−8.7	5.4
1946	211.1	225.6	−14.5	6.9

The relatively large residuals in these 9 years, however, do not change the fact that the standard error of estimate for the period of 23 years as a whole is as small as $5.8 billion. It is therefore seen that, where economic variables show a high degree of collinearity, it is possible to chart the movement of any one of them on the basis of the others. This is a blessing from the point of view of forecasting, but at the same time it becomes an almost impossible task to segregate the influence

of one exploratory variable from those of other variables in a structural equation. This point is of such fundamental importance that we shall illustrate it with a few examples. In connection with the investment functions, equations (2a) and (2b), it has been explained that GNP and GNP_{-1} are introduced as explanatory variables on the ground that they reflect the levels of demand for final goods to be produced from the capital assets for which investment is to be made. These considerations, together with D^2 and t, succeed in explaining 98 per cent of the variation in investment. But how about the effects of profits on investment? Except for the negative effects of t, profits have not been included as an explanatory variable. But certainly profits should be the main incentive for making investment, and their influence on investment has been found significant in many empirical studies. Is, therefore, the influence of profits on investment lost in equations (2a) and (2b)? The answer is that it is not lost, but is inseparably included in the GNP and GNP_{-1} variables. Profits are, roughly speaking, the difference between GNP and the sum of certain taxes, total wage bills, and depreciation allowances. The last two items are highly correlated with GNP. Hence, by including GNP and GNP_{-1} in the equation, the influences of current and past profits are taken into account. There is very little room left in equations (2a) and (2b) to bring current and lagged profits in as additional explanatory variables. The standard errors of the regression coefficients would then be so high that the influences of these variables would not be clearly revealed.[29]

A similar case is found in the absence of the M variable from equations (2a) and (2b). If private cash balances had an important bearing on consumption, it is reasonable to assume that they would also affect investment decisions. This symmetry argument is probably quite sound. The effects of M on I, however, are probably already included in the GNP and GNP_{-1} terms in equations (2a) and (2b). As has been shown in equations (4a) and (4b), M is closely tied up with these two variables.

The moral of this discussion is of course quite obvious. Given the limited number of observations that are available, the economic reality is too complicated to establish the kind of structural equation that would permit the measurement of any specific cause-and-effect relationship between one variable and another. If the investment functions, equations (2a) and (2b), are taken as an illustration, it may be said that the GNP and GNP_{-1} coefficients tend to confirm (or rather do not contradict) each of the three following theories of investment at the same time: (1) the final demand theory, (2) the profit theory, and (3) the liquidity theory. The relative influences of these theories, however, are hopelessly knit together in the two coefficients, incapable of being revealed separately. To replace the GNP and GNP_{-1} variables with some other variables (say, profits) would present the same difficulty. Yet, the limited number of observations could not accommodate all the variables that have an important bearing on the problem in a structural equation and, at the same time, yield meaningful and significant regression coefficients. This is one of the basic reasons why the current procedure of using the solutions of the structural relationships as the forecasting equations should be rejected.

The same collinearity tendencies are admittedly present in the forecasting equations used in this paper.[30] Indeed, as explained earlier, we are dependent upon these collinearity tendencies to "catch" the important forces acting upon a given endogenous variable so that forecasting may be successful. On the other hand, no commitment is made on any of the structural coefficients (such as the propensity to consume) which, although they cannot be estimated accurately, are the bases for forecasting in the procedure suggested in most of the current literature in this field. It should be noted, however, that the regression coefficient of a given predetermined variable in the forecasting equation represents, in addition to whatever influence that variable may have on the endogenous variable, a mixture of

[29] In fact, it is already quite difficult to separate the influences of GNP and GNP_{-1} even without the profit terms. See equations (2a) and (2b).

[30] The least squares reduced-form equations, each representing a direct least squares regression of an endogenous variable on all predetermined variables.

many other influences which usually go together with the predetermined variable concerned. It is, therefore, quite possible that in some cases the collinearity tendencies among the predetermined variables are such that the separate mixtures of influences of the different predetermined variables cannot be ascertained with accuracy.

Degree of aggregation and collinearity

A problem closely related to collinearity is the degree of aggregation in the model. There is, of course, general agreement on the desirability of disaggregating the variables as far as possible. With respect to consumption, for instance, it obviously would be an important gain if separate functions could be obtained for durable goods, nondurable goods, and services, instead of only one function for consumption as a whole. Similarly, it would be very desirable to classify disposable personal income either by types (profits, wages, etc.) or by sizes (below $3,000, etc.). The list of desirable disaggregations can be extended almost indefinitely; but all attempts at disaggregation involve the building of larger and larger models. More and more predetermined variables must be brought into the system. The number of predetermined variables, and hence the size of the model, however, is severely limited by the small number of observations available in the data and the collinearity involved in the variables. An example is found in the introduction of the S variable (i.e., the sum of Federal Reserve holdings of government securities and monetary gold stock) into equation (7), it being recalled that equation (6) has the same set of variables except for the omission of S. It has been seen that the S variable appears with an unreasonable sign and with a very large standard error.[31] When there are only some 20 observations, collinearity among the economic variables is such that it would not be possible to develop models with more than four or five predetermined variables.

Collinearity among economic variables usually makes it almost impossible to establish meaningful structural relationships.[32] It also tends to make it exceedingly difficult to develop large statistical models—and this is a serious limitation, for the larger the model, the greater would be the probability that it would approximate reality. Even for the variables actually capable of being built into the model, it is often difficult to separate accurately the specific influence of one variable on another from other influences. On the other hand, these are obstacles to accurate, quantitative evaluations against which methods other than econometrics are equally or even more hopeless. Moreover, while collinearity would often hinder a conclusive verification of specific economic hypotheses, it usually makes it possible to forecast the future developments of important economic variables on the basis of a few carefully selected key predetermined variables. While the accuracy of these forecasts obviously depends upon continuation of the same collinearities implied in the model, these forecasts can usually be made with a quite high degree of confidence.[33]

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[31] Another way of looking at the result is that the correlation coefficient of equation (7) is not increased noticeably by the introduction of the S variable, compared with that of equation (6). The S variable has not brought with it any useful information that is not already supplied by the other predetermined variables.

[32] This is in addition to the difficulty of "underidentification"; see pages 436–37 and Appendix III.

[33] The S variable (sum of Federal Reserve holdings of government securities and monetary gold stock) in connection with equations (6) and (7) may again serve as an example. The inclusion of S in equation (7) did not noticeably increase the correlation coefficient, compared with that of equation (6), and the standard error of the S coefficient is large relative to the coefficient itself. This, of course, means that S is so highly correlated with the other five predetermined variables in the equation that its influence on GNP cannot be clearly segregated from the effects of the other five variables. In fact, if S is correlated with the other five variables as explanatory variables, a correlation coefficient in the neighborhood

Real terms vs. money values

The existing models are preponderantly in real terms. The models presented in this paper, however, are composed of variables in current values. There do not seem to be sufficient a priori considerations to justify rejection of the hypothesis of a system in current money values as an alternative to a real system. Take the consumption function as an example. The conventional form is to assume real consumption as a function of, among others, real disposable income.[34] Much of the savings of a great majority of people consists of pension and life insurance payments. The former is usually a fixed percentage of money income and the latter is a fixed amount of regular periodic payments, both being in current money terms.

The impression created when variables are measured in current money values, instead of in real terms, is often said to illustrate the importance of the "money illusion." There is a simple way to test whether in any given situation the money illusion has a significant effect. For example, the following simple consumption function in money terms

$$C = a\,Y_d + b \tag{17}$$

may be divided throughout by P, an appropriate price level, to obtain the following equation, in which c and y_d are consumption and disposable income in real terms:

$$c = ay_d + \frac{b}{P} \tag{18}$$

If the statistical estimate of b (say, 5.0) has a very large statistical error (say, 3.0), then b may be ruled out as statistically not significantly different from zero. In other words, the term $\frac{b}{P}$ drops from equation (18) and real consumption is a function of real income only. Money illusion, then, does not exist to any noticeable extent.

This simple technique may be applied to equation (10), which is the basis of our forecasts for GNP. The constant term in that equation is 52.48, which has a standard error equal to 14.13; it is therefore a quite significant, positive constant term. There are, however, other variables in the equation which are not expressed in current money values. The result of dividing equation (10) throughout by Q, the

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of 0.99 is likely. For forecasting purposes, therefore, the result obtained from equation (6) will be satisfactory (insofar as the effects of S are concerned) if in the future the same collinearity relationship holds between S and the other five variables. The forecast, of course, will not be as good if S moves in such a way that it is out of step with the other variables. It should be noted, however, that the collinearity relationship between S and the other variables implied in equation (7) is based on the experience of 23 years.

[34] This real form is often claimed to have a firm foundation in micro-economic theory. Actually, one usually has to make quite a number of heroic efforts in trying to connect a crude, aggregate function of any kind with the familiar kind of micro-economic theory, containing almost equally crude assumptions different from (and sometimes contradictory to) those underlying the aggregate functions. Even if the gaps between macro- and micro-theories can somehow be assumed as closed, it can easily be shown that the kind of consumption function that would correspond with the maximization of utility functions under budget restraints would be one which has real consumption as a function of, among other things, money (not real) income and prices. A function of real consumption in terms of real income would seem to deviate more from the traditional micro-economic theory than a function of money consumption in terms of money income, since the former leaves no possibility for the price level to play any role in connection with consumption.

GNP deflator, is as follows (gnp, k, and p being the real versions of GNP, K, and P, respectively):

$$gnp = 0.39gnp_{-1}\frac{Q_{-1}}{Q} + 2.12k + 4.75p - \frac{1}{Q}(.009D^2 + 2.65t - 52.48) \quad (19)$$

This shows that Q plays an important role in the equation.

Weakness in the predetermined variable K

A second possible criticism of the present attempt is directed against the inclusion of the change in business inventories and net foreign investment in K, a predetermined variable. Imports of goods and services probably can be included in the system as an endogenous variable without much difficulty, but this has not been attempted here. If this were done, net foreign investment would be replaced by the value of exports of goods and services as a part in the predetermined variable K. For a study of the U.S. economy, exports may be reasonably considered as a predetermined variable.

To consider changes in business inventories as a part of a predetermined variable is admittedly untenable. There can be little doubt that fluctuations in business inventories are determined largely by forces generated by the economic system itself. It is believed, however, that inventory fluctuations, more than the fluctuations of any other variable, must be explained by models with a unit period much shorter than a year. Models built on annual data are extremely unlikely to be capable of throwing any light on the problem. The inclusion of changes in inventories in K merely evades the issue; it is a violation of the concept of a predetermined variable, though very little can be done to remedy this defect.

In fact, all the predetermined variables (except GNP_{-1}, which is a lagged variable)[35] used in this paper can be criticized on similar grounds. Obviously, government expenditures and tax rates are not determined completely independently of the working of the economic system; even less so are the unemployment payments included in the variable P. If the requirements of the concept of a predetermined variable are strictly enforced, there are probably no variables left that can be considered to be predetermined, with the exception of weather conditions and natural calamities (and hints have already been given of the possibility of man-made rainfall). For instance, neither population nor consumers' tastes and preferences nor changes in production technique, etc., are truly predetermined variables. In economic studies, therefore, there is relative predeterminateness but not much absolute predeterminateness. With the exception of inventory changes and foreign investment, the predetermined variables used in this paper are probably much nearer the concept of predetermined variables than the endogenous variables included in the system.

II. A Comparison of the Forecasting Equations with "Naive Models"

A comparison of the results of the method used above with those of some other approaches that do not involve elaborate methods and extensive work is of interest. An econometric model can be justified only when its results are better than those that can be obtained by simpler and less costly methods. Two such simple standards of comparison exist, and are often referred to as "naive models" I and II.[36] As Professor Friedman has put it, any econometric model implies a theory of

[35] Even the use of a lagged endogenous variable as a predetermined variable would weaken certain desirable statistical properties of the least squares estimates.

[36] See Carl Christ, "A Test of an Econometric Model for the United States, 1921–47," Cowles Commission Papers, New Series, No. 49 (1952), pp. 56–58.

TABLE 9. DERIVATIONS OF OBSERVATIONS FOR THE NAIVE MODELS

Year	Actual Values	Computed Values	
		Naive Model I	Naive Model II
1941	110		
1942	116	110	
1943	124	116	116 + (116 − 110) = 122
1944	121	124	124 + (124 − 116) = 132

TABLE 10A. COMPARISON OF EQUATION (10) AND NAIVE MODELS I AND II

Year	Actual GNP	Residuals from		
		Equation (10)	Naive Model I	Naive Model II
1929	103.8	8.9	—	—
1930	90.9	−4.1	−12.9	—
1931	75.9	−5.7	−15.0	−2.1
1932	58.3	−1.9	−17.6	−2.6
1933	55.8	3.1	−2.5	15.1
1934	64.9	4.1	9.1	11.6
1935	72.2	−3.2	7.3	−1.8
1936	82.5	−0.1	10.3	3.0
1937	90.2	−3.2	7.7	−2.6
1938	84.7	−6.8	−5.5	−13.2
1939	91.3	3.0	6.6	12.1
1940	101.4	5.2	10.1	3.5
1941	126.4	9.7	25.0	14.9
1942	161.6	−8.7	35.2	10.2
1943	194.3	−0.9	32.7	−2.5
1944	213.7	5.5	19.4	−13.3
1945	215.2	−4.2	1.5	−17.9
1946	211.1	−14.5	−4.1	−5.6
1947	233.3	9.5	22.2	26.3
1948	259.0	0.3	25.7	3.5
1949	258.2	−3.6	−0.8	−26.5
1950	286.2	2.6	28.0	28.8
1951	329.8	1.9	43.6	15.6
1952	348.0	3.1	18.2	−25.4

change, summarizing the essential forces responsible for the changes.[37] The theory implied in the econometric model may be tested against the following two alternatives. Naive model I, essentially a stationary hypothesis, says that the value of a variable next year will be the same as the value this year. With allowance for a particular kind of secular change, naive model II assumes that the change in the value of a variable from this year to the next will be in the same direction and by the same amount as that from last year to this year. Thus, if the actual figures of a variable are those given in the first column of Table 9, the computed values of naive models I and II are those given in the second and third columns, respectively.

[37] Discussion by Milton Friedman of Christ's paper, *ibid.*, pp. 109–11.

TABLE 10B. COMPARISON OF EQUATION (11) AND NAIVE MODELS I AND II

Year	Actual Consumption	Residuals from		
		Equation (11)	Naive Model I	Naive Model II
1929	78.8	7.1	—	—
1930	70.8	−2.8	−8.0	—
1931	61.2	−3.5	−9.6	−1.6
1932	49.2	−2.2	−12.0	−2.4
1933	46.3	0.9	−2.9	9.1
1934	51.9	2.9	5.6	8.5
1935	56.2	−2.6	4.3	−1.3
1936	62.5	−0.2	6.3	2.0
1937	67.1	−3.0	4.6	−1.7
1938	64.5	−5.3	−2.6	−7.2
1939	67.5	2.1	3.0	5.6
1940	72.1	2.9	4.6	1.6
1941	82.3	5.8	10.2	5.6
1942	91.2	−3.4	8.9	−1.3
1943	102.2	−1.0	11.0	2.1
1944	111.6	3.2	9.4	−1.6
1945	123.1	−1.6	11.5	2.1
1946	146.9	−7.5	23.8	12.3
1947	165.6	8.9	18.7	−5.1
1948	177.9	0.5	12.3	−6.4
1949	180.6	−0.8	2.7	−9.6
1950	194.6	0.2	14.0	11.3
1951	208.1	−0.5	13.5	−0.5
1952	218.1	0.0	10.0	−3.5

The residuals obtained from equations (10), (11), and (12) are compared with their respective naive models in Tables 10A, 10B, and 10C. Since there are 24 observations, there are 23 possible comparisons with naive model I and 22 with naive model II. The number of years in which the naive models are superior (i.e., the residuals produced by them are smaller) is as follows:

	Naive Model I	*Naive Model II*
For GNP	5	5
For Consumption	1	8
For Investment	7	7

While the naive models, especially model II, are superior in a substantial number of years, the mean square errors of equations (10), (11), and (12) are a great deal smaller than those of the respective naive models, as shown in Table 11. The result of the comparison is therefore relatively favorable to the forecasting scheme proposed here. In general, the method proposed in this paper may be regarded as a far more reliable forecasting device than either of the two naive models.

TABLE 10C. COMPARISON OF EQUATION (12) AND NAIVE MODELS I AND II

Year	Actual Investment	Residuals from Equation (12)	Residuals from Naive Model I	Residuals from Naive Model II
1929	14.2	1.8	—	—
1930	10.5	−1.4	−3.7	—
1931	6.8	−2.1	−3.7	0.0
1932	3.5	0.4	−3.3	0.4
1933	2.9	2.1	−0.6	2.7
1934	3.9	1.3	1.0	1.6
1935	5.3	−0.6	1.4	0.4
1936	7.3	−0.1	2.0	0.6
1937	9.1	−0.4	1.8	−0.2
1938	7.3	−1.6	−1.8	−3.6
1939	9.5	1.1	2.2	4.0
1940	11.7	2.4	2.2	0.0
1941	14.5	3.9	2.8	0.6
1942	8.9	−5.2	−5.6	−8.4
1943	6.6	0.1	−2.3	3.3
1944	8.5	2.3	1.9	4.2
1945	11.4	−2.6	2.9	1.0
1946	22.6	−7.0	11.2	8.3
1947	31.0	0.5	8.4	−2.8
1948	37.6	−0.2	6.6	−1.8
1949	35.9	−2.9	−1.7	−8.3
1950	45.0	2.9	9.1	10.8
1951	47.7	2.3	2.7	−6.4
1952	48.8	3.0	1.1	−1.6

TABLE 11. MEAN SQUARE ERRORS

Variable	Forecasting Equations	Naive Model I	Naive Model II
GNP	33.89	364.51	214.12
Consumption	14.03	110.17	34.22
Investment	6.71	19.65	20.41

III. Reduced-Form Solutions and Reduced-Form Least Squares Equations: A Preliminary Discussion

In this paper, "least squares reduced-form equations"[38] have been used for making forecasts. This method is quite different from that recommended in the current literature, where forecasts are based on the corresponding[39] "reduced-form solutions."[40] For a system consisting partly or entirely of "overidentified" structural relationships, the two methods do not give identical results. The reasons

[38] See footnote 7.

[39] Corresponding in the sense of having the same set of predetermined variables.

[40] See footnote 4. This position is clearly stated by L. R. Klein, *op. cit.*, especially pp. 251–55. See also Carl Christ, *op. cit.*, p. 44; W. C. Hood and T. C. Koopmans, eds., *op. cit.*, especially pp. 176–77; and the many discussions of the bearing of a priori restrictions on the problem of estimation in T. C. Koopmans, ed., *Statistical Inference in Dynamic Economic Models* (New York, 1950).

for preferring least squares reduced-form equations may be briefly summarized as follows.

The joint probability distribution of the current values of the endogenous variables, given the predetermined variables, can always be expressed in such a way that the parameters in the distribution are the coefficients, and also the elements of the covariance matrix of the disturbances, in the reduced-form functions. The likelihood function of the sample can therefore be expressed as a function of these parameters.[41] For an overidentified system, the coefficients in the reduced-form functions are estimated by the procedure recommended in the current literature at those values which maximize this likelihood function, subject to the so-called a priori restrictions (economic hypotheses) implied in the forms of the assumed structural relations.[42] In other words, the maximization process is used to attain a restricted maximum (and, for an overidentified system, lower than the absolute or unrestricted maximum) in such a manner that a "backward solution" of the coefficients so obtained for the reduced-form functions will yield unique estimates for the overidentified coefficients in the assumed structural relations. The reduced-form functions thus obtained are what have been referred to above as the "reduced-form solutions" of the identified system. Since the maximum reached is restricted, the probability of obtaining the sample actually observed is smaller if the true values of the coefficients in the reduced-form functions are equal to those in the reduced-form solutions so obtained than if they are equal to those in what has been referred to as the "least squares reduced-form equations."

The maximum likelihood principle is "compromised" in the reduced-form solutions approach[43] on the ground that the so-called a priori restrictions (i.e., the imposed condition that certain variables are absent from a given structural equation) have to be satisfied. These a priori restrictions are really mostly oversimplifications of economic reality. The complexity of the modern economy makes it certain that there will always be many variables (of both the jointly dependent and the predetermined type), besides those actually included, which have an influence on the variable being explained[44] in any of the overidentified statistical equations in existence. The realization of this important fact leads to the following conclusions. First, all structural equations are likely to be underidentified (rather than over- or exactly identified). One may start with any overidentified statistical equation in existence (say, any of the estimated U.S. consumption functions or investment functions), and then include in it variables that were absent from it but are clearly relevant.[45] The inclusion of these variables (whether of the jointly dependent or of the predetermined type, and whether already included elsewhere in the model or not) will soon make the equation an underidentified one. Second, the a priori restrictions do not constitute any constraint on the likelihood function of the sample, either in an underidentified or in an exactly identified structural equation. The least squares reduced-form equations are thus identical with the corre-

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[41] See, for instance, equation (5.6) in T. W. Anderson and Herman Rubin, "Estimation of the Parameters of a Single Equation in a Complete System of Stochastic Equations," *op. cit.*, p. 53.

[42] The general nature of the procedure is the same, whether the full-information or the limited-information maximum likelihood method is used.

[43] The "compromise" occurs only in the overidentified cases, as the reduced-form solutions and the least squares reduced-form equations are otherwise identical. Practically, however, all the statistically estimated structural equations in existence are overidentified. Underidentified cases are seldom discussed in the literature, although they are in fact the only important cases.

[44] Whether, on account of the collinearity tendencies, these influences are statistically discernible or not is irrelevant to the point at issue.

[45] For instance, any variable which has been found by some other investigator to be a significant explanatory variable for the dependent variable which is under examination. One could always, in this manner, easily compile a long list of "verified" explanatory variables for any given problem.

sponding reduced-form solutions in the underidentified, as well as in the exactly identified, cases.[46] Since all structural relations are likely to be underidentified, the least squares reduced-form equations should, therefore, always be used as the forecasting equations.[47]

It has been explained above (pp. 436–38) that some structural estimation is still required for the purpose of selecting the predetermined variables.[48] Since this "exploratory" estimation would include only the small number of endogenous variables in whose future magnitudes we are interested, the "exploratory" structural system would usually consist of overidentified structural relationships. After the predetermined variables have been so decided upon and the least squares reduced-form equations have been established, it is possible to go one step further and to throw a little more light on the structural relationships than the overidentified (hence, oversimplified) exploratory model has been able to provide. For the same set of predetermined variables, an underidentified structural system will have the same reduced forms as an exactly identified system. Starting with the overidentified exploratory model, additional endogenous variables, which, next to those already included in the equation, are believed to be the most relevant and important, may be introduced into any given structural equation, until the equation is exactly identified.[49] It is understood, of course, that on account of the working of collinearity tendencies the structural coefficients so obtained also possibly represent the influences of many other variables whose movements are more or less similar. These estimated structural relationships, however, have revealed the identities (if not the real magnitudes of their influence) of a number of variables that had a bearing on the dependent variables concerned, the number being the largest that the available data are capable of revealing.

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[46] This is true, even though the structural coefficients in the underidentified cases cannot actually be uniquely determined.

[47] The conclusion that all structural equations are likely to be underidentified can be established by an interesting application of the maximum likelihood principle. The least squares reduced-form equations always explain the movement, during the sample period as a whole, better than the corresponding reduced-form solutions derived from an overidentified system. This is, of course, inherent in the least squares method. Since the least squares reduced-form equations are identical with the corresponding reduced-form solutions only when the structural equations are exactly identified or underidentified, and since a structural relation is unlikely to be exactly identified unless by accident, we conclude that it is most probable that the structural equations are underidentified.

It should be intuitively clear that there is no basis for the belief that the reduced-form solutions derived from an overidentified system, which during the sample period do not "forecast" so well as the corresponding least squares reduced-form equations, would give better results for any future period.

[48] The process of selection naturally implies experiments with different predetermined variables. The view has often been expressed that the significance of a relationship, established only after experimental selection of the explanatory variables, cannot be judged by the usual standards of test of significance. This view has been criticized in a note by S. C. Tsiang, "Experimental Selection of Explanatory Variables and the Significance of Correlation," *Econometrica*, Vol. 23 (1955), pp. 330–31. Even if it were accepted, it would not, however, mean that experimental selection of variables is not the best way to develop a forecasting equation; it merely rejects the application of the usual tests of significance to the result of such selections.

[49] The reduced-form solutions of such a system of exactly identified structural relations are the same as the least squares reduced-form equations obtained.

The International Monetary Fund, 1953–1954: A Selected Bibliography

Martin L. Loftus*

THE SELECTED REFERENCES presented in this bibliography cover books, pamphlets, reports, and periodical articles which describe the functions, organization, and activities of the International Monetary Fund. Publications on the various aspects of international economics are included only when they contain material relating specifically to the Fund. This is a continuation of the bibliographies published in *Staff Papers*, Vol. I, No. 3 (April 1951) and Vol. III, No. 1 (April 1953). A few publications issued before 1953, which were not included in the previous bibliographies, are also listed here. Although most of the Fund's official publications are included, this is not intended to be a complete bibliography of such publications.

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